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Identification of Ectoparasites that Infect Mangrove Crabs (*Scylla Serrata*) in Asahan District, Indonesia

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Abstract. The purpose of this study was to determine the type and level of prevalence and intensity of ectoparasites that infect mud crabs (*Scylla serrata)* in Asahan district. The method of data collection was carried out by field observation methods carried out in the sea silos, Pematang Baru, and Sei Kepayang areas. The crab samples observed were live crabs, the number of mud crabs taken for the sample was 10% of each population. Furthermore, in the carapace, the type of parasite that attacks is *Trichodina sp* with a prevalence rate of 38%. This parasite infected 5 of the 13 samples. Then the types of parasites *Carchesium sp* and *Poecilasmatidae* each with a prevalence rate of 31% these two types of parasites infect 4 samples of crabs found at the foot of theroad, this type of parasite infects 4 out of 13 samples. Then the types of parasites *Carchesium sp* and *Poecilasmatidae* each with a prevalence rate of 31% these two types of parasites infect 4 samples of crabs found at the foot of theroad, this type of parasite infects 4 out of 13 samples. Then the types of parasites *Carchesium sp* and *Poecilasmatidae* sp each with a prevalence rate of 31% these two types of parasites infect 4 samples of crabs found at the foot of theroad, this type of parasite infects 4 out of 13 samples. The crabs that attack the sea silos are *Octolasmis sp, Ichtyopthyrius multifilis, Trichodina sp, Zoothamnium sp*. The parasites that attack the new ponds are *Octolasmis sp, Carchesium sp, Zoothamnium sp*, and the parasites that attack Sei Kepayang are *Octolasmis sp, Carchesium sp, Poecilasmatidae sp, Trichodina sp*. The intensity of the parasites found was classified as moderate but for the parasite *Octolasmis sp.*

1. Introduction

North Sumatra is one of the provinces that has a very wide coastal area, so it has enormous potential in producing fishery and marine resources[1]. North Sumatra's fisheries and marine potential comes from 100,000 hectares of marine aquaculture, 81,372.84 hectares of freshwater aquaculture, consisting of 20,000 hectares of pond cultivation, and 155.797 hectares of public waters.[2]. Indonesia is known as one of the largest crab exporting countries[3]The demand for crab commodities continues to increase, both in the domestic and foreign markets, thus making this organism one of the mainstay commodities for export accompanying tiger prawns, but unfortunately most of its production still comes from catches in nature, causing a decline in the population of mangrove crabs in the wild. decreasing. To overcome the increasing food needs, it is necessary to strive for the preservation of crab cultivation[4].

Mangrove crab is one of the fishery commodities that live in coastal waters and in mangrove areas.

This species is found in almost all waters in the world, from the east coast of Africa, the Indian Ocean and the Western Pacific, the waters of Tahiti, the sea of Okinawa, Japan, the waters of Sydney in Australia, and the South China Sea and the Java Sea in Southeast Asia.[5]. Efforts to develop mud crab cultivation face obstacles in the form of ectoparasite attacks[6]. One of the problems found in the cultivation of mud crabs is the high mortality rate which may be caused by the presence of disease and ectoparasites. The attack of ectoparasites is very dangerous for mud crabs because it can cause damage to body organs in mud crabs, including damaged body surfaces and damage to the gills of mud crabs [7]. Triggers for ectoparasite attacks include stress, poor water quality, stocking density and an imbalance between environmental carrying capacity and production quantity in one cultivation area. Poor or polluted water quality can reduce the immunity of mangrove crabs (*Scylla serrata*) so that mangrove crabs (*Scylla serrata*) are susceptible to parasites.[8]

Research on parasites in mangrove crabs (*Scylla serrata*) has received less attention from researchers. Understanding the profile of the parasite that attacks the mud crab (*Scylla serrata*) is an important thing for crab populations both in nature and in aquaculture ponds. Understanding parasite profiles in aquaculture activities can take into account the effects of parasites on farm animals[4]Given these problems, it is necessary to identify ectoparasites to find out what parasites attack the mud crab (*Scylla serrata*) in the Asahan district in order to provide information to farmers.

2. Materials and Methods

The research method used is an exploratory method, which is a type of research that has the aim of exploring or deepening knowledge or looking for new ideas about a particular matter in order to formulate problems in more detail.

The method of data collection was carried out by field observation methods carried out in the marine silo, Pematang Baru, and Sei Kepayang areas. The crab samples observed were live crabs, the number of mud crabs taken for the sample was 10% of each population[5]Mangrove crabs in Pematang Baru, Silo Laut and Sei Kepayang were repeated three times in a period of 10 days. The samples that have been taken are packed with styrofoam from the fishermen's location to be brought and examined at the Aquaculture Laboratory, Faculty of Agriculture, Asahan University.

2.1 Ectoparasite Examination

The ectoparasites found in crabs are generally from the phylum Protozoa and Arthropoda. The parts observed included carapace, swimming legs, walking legs, claws and gills. To check for parasites from crabs, a scalpel was scraped using a scalpel on the gills, swimming legs, walking legs, claws and carapace, then placed on an object glass, given aquadest and then covered with a cover glass. The results of observations can be seen using a microscope, as well as recording each species and calculating the intensity of parasites that attack crabs and documented. Parameters observed were the prevalence and intensity of parasites found in mud crab (*Scylla serrata*). Calculation of Prevalence using the formula of [9].

$$Prevalensi = \frac{number\ of\ sampels\ infected\ with\ parasites}{total\ number\ of\ sampel\ examined} \times 100\%$$

According t [9] for the classification of infected fish based on their prevalence, namely:

Table 1. Criteria for the Prevalence of Parasite Infections

No	Attack Rate	Prevalence Value	Information
1.	Always	99 – 100%	Very severe infection
2.	Almost Always	90 – 98%	Severe infection
3.	Usually	70 – 89%	Moderate infection
4.	Frequently / Very often	50 – 69 %	Very frequent infection
5.	Commonly / Generally	30 – 49%	Common infection
6.	often	10 – 29%	Frequent infections
7.	Occasionally / Sometimes	1 – 9%	Infection sometimes
8.	Rarely / Rarely	< 0.1 – 1%	Rare infection
9.	Very Rarely / Very Rarely	< 0.01 – 0.1 %	Very rare infection
10.	Almost Never	< 0.01%	Infection never

Intensity is used to determine the number of types of parasites found in fish infested with parasites.The parasite intensity value for each pond is calculated by the formula, namely:

$$Intensity = \frac{Number\ of\ infected\ \ A\ parasites}{Number\ of\ sampel\ infected\ with\ A\ Parasites}$$

According in the classification of intensity refers to:

Table 2. Parasite Intensity Criteria

No	Infection category	Intensity (in/tail)
1.	Very low	< 1
2.	Low	1 – 5
3.	Currently	6 – 55
4.	Critical	56 – 100
5.	Awfully	> 100
6.	Super infection	> 1000

The data is presented in the form of tables and figures and analyzed descriptively which aims to describe the existing symptoms based on the data taken through observation. The ectoparasites examined were the carapace, walking legs, swimming legs and gills. The examination was carried out on fresh mangrove crabs (*Scylla serrata*), which were still alive.

3. Results and Discussion

From the total number of crab samples taken from the Silo Laut location, several types of parasites that infectmud crab (*Scylla serrata*) *Octolasmis sp, Ichtyopthyrius multifilis, Trichodina sp, Zoothamnium sp*. The data obtained for the prevalence, intensity and parasitic organs in the sample crabs are described in Table 5. Table 5 above can be seen that the parasite *Octolasmis sp* has the highest prevalence rate on the gills, namely 90% of this parasite infects 9 out of 10 samples. Nextin the carapace the type of parasite that attacks is *Zoothamnium sp* with a prevalence rate of 40% this type of parasite infects 4 out of 10 samples, thentype of parasite *Ichtyopthyrius multifilis* and *Trichodina sp*, each with a prevalence rate of 20%, these two types of parasites infect 2 sample crabs found at the foot of the road, this type of parasite infects 2 out of 10 samples.The intensity of the parasites found at the marine silo location was moderate, but the parasite

Octolasmis sp had a very severe infection category.

Table 3. Prevalence, intensity and parasitic organs found inmud crab (*Scylla serrata*).

Parasite Type	Organ	infected crab	Number of Parasites	Intensity	Prevalence
Octolasmis sp	Gill	9	1116	124	90
Ichtyopthyrius multifilis	walking legs	2	142	71	20
Trichodina sp		2	1	2	20
Zoothamnium sp	Carapace	4	26	6	40

3.1 New Pematang Location

From the total number of crab samples taken from the Pematang Baru location found several types of parasites that infectmud crab (*Scylla serrata*) *Octolasmis sp, Carchesium sp, Zoothamnium sp*. The data obtained for the prevalence, intensity and organ of the parasite in the sample crabs are described in Table 4.

Table 4. Prevalence, intensity and parasitic organs found inmud crab (*Scylla serrata*).

Parasite Type	Organ	infected crab	Number of Parasites	Intensity	Prevalence
Octolasmis sp	Gill	10	840	84	83
Carchesium sp	Swim feet	2	11	11	17
Zoothamnium sp		2	38	19	17

Table 4 above shows that the parasite *Octolasmis sp* has the highest prevalence rate on the gills, which is 83% of this parasite infecting 10 of the 12 samples. Next type of parasite *Carchesium sp* and *Zoothamnium sp*, each with a prevalence rate of 17%, these two types of parasites infect 2 sample crabs found on the foot of the road, this type of parasite infects 2 of the 12 samples. The intensity of the parasite found in the new bund location was moderate, but for the parasite *Octolasmis sp* it was categorized as severe infection.

3.2 Sei Kepayang Location

From the total number of crab samples taken from the Sei Kepayang location found several types of parasites that infectmud crab (*Scylla serrata*) *Octolasmis sp, Carchesium sp, Poecilasmatidae sp, Trichodina sp.* The data obtained for the prevalence, intensity and parasitic organs in the sample crabs are described in Table 5.

Table 5. Prevalence, intensity and parasitic organs found inmud crab (*Scylla serrata*).

Parasite Type	Organ	infected crab	Number of Parasites	Intensity	Prevalence
Octolasmis sp	Gill	8	1852	231	61
Carchesium sp		4	16	4	31
Poecilasmatidae sp	Swim feet	4	8	2	31
Trichodina sp	Carapace	5	13	3	38

Table 5 above can be seen that the parasite *Octolasmis sp* has the highest prevalence rate on the gills, namely 61% of this parasite species infecting 8 of the 13 samples. Nextin the carapace the type of parasite that attacked was *Trichodina sp* with a prevalence rate of 38% this type of parasite infected 5 of the 13 samples, then type of parasite *Carchesium sp*and *Poecilasmatidae*, each with a prevalence rate of 31%, these two types of parasites infect 4 sample crabs found at the foot of the road, this type of parasite infects 4 out of 13 samples.The intensity of the parasites found at the Sei Kepayang location was classified as moderate, but the parasite *Octolasmis sp* had a severe infection category.

3.3 Water quality

Table 6. Water Quality Parameters in Asahan Regency

Location	Temperature(°C)	Salinity (‰)	pH
Sea Silo	30	20	8
New Pematang	31	25	8
Sei Kepayang	29	20	7

Water quality measurements were taken at 3 locations: Sea Silo obtained a temperature of 30 °C, salinity 20, pH 8. New Embank mentobtained temperature 31°C, salinity 25, pH 8 and on Sei Kepayang obtained temperatures ranging from 29 oC, salinity ranged from 20, pH 7. Based on the results of calculating the prevalence and intensity of ectoparasites for each species, the type of ectoparasites with the highest intensity was *Octolasmis sp*. *Octolasmis sp* can attach by hooking its legs on the gills which can support the rapid breeding process. *Octolasmis sp* is only found in gill organs because its life cycle requires more nutritional needs than *Zoothamnium sp* and other parasites. *Octolasmis sp* is an ectoparasite of the Arthropoda group which has a predilection for the gill organs, and if the intensity is high, *Octolasmis sp* can be seen near the mouth and gill holes. This is supported by [10] which stated that *Octolasmis sp* infested the gills and oral wall.

3.4 Types of Parasites Found

a. Octolasmis sp

From the results of the study, it was found that the parasite *Octolasmis sp* (Figure 1) was often found attached to the gill organs of crabs. In the marine silo area the prevalence of *Octolasmis sp* was 90% and 124 int/head, in the new Pematang area the prevalence of *Octolasmis sp* was 83% and 84 int/head, and in the Sei Kepayang area the prevalence of *Octolasmis sp* was 61% and 231 int/head. This parasite can cause the death if the population is high because it interferes with the respiratory system. *Octolasmis* are white, contractile, have tergum, carina, scutum, capitulum and live in colonies. Symptoms caused by the *Octolasmis sp* parasite absorb nutrients and gill body tissues, suck the host's blood and filter food in the form of plankton and dentritus which is the food of the *Octolasmis sp* parasite obtained from the respiration process carried out by crabs.

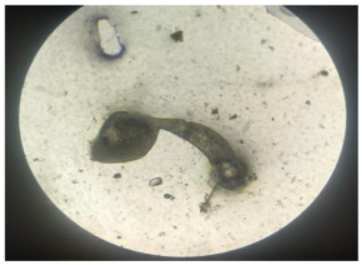

Figure 1. *Octolasmis sp*

b. Trichodina sp

During the study in the marine silo area *Trichodina sp* (Figure 2) was found at the foot of the road with a prevalence of 20% and 2 int/head and in the Sei Kepayang *Trichodina sp* area in the carapace section with a prevalence of 38% and 3 int/bird. *Trichodina sp* is a parasite in the form of a round disc with teeth in the middle. On the side of the body has a convex shape, this part serves as a place to attach cilia so that they can move on the host's body. This parasite has two parts, namely anterior and posterior which are concave in shape and function as attachments to the host. *Trichodina* has a very important role in reducing fish immunity and the occurrence of secondary infections. The population of *Trichodina sp* in the water increases at the time of the change of seasons, from summer to winter.

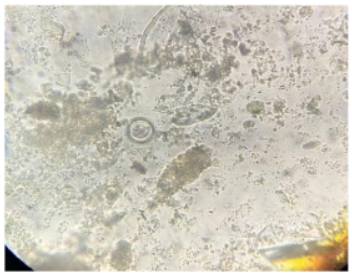

Figure 2. *Trichodina sp*

c. Ichthyopthyrius multifilis

The results of the research conducted found *that Ichthyophthirius multifiliis* (**Figure 3**) was only found in the sea silo area and was found at the foot of the road with a prevalence of 20% and 71 int/head, *Ichthyophthirius multifiliis* was circular in shape, containing a horseshoe-like nucleus, and fat granules. According to Kabata, those who are attacked by *Ichthyophthrius multifiliis* will form white spots with a diameter of 0.5-1mm so that this disease is often called white spot disease which forms colonies. *Ichtyophthrius multifilis* is a type of parasite that is classified:

Figure 3 . *Ichthyophthirius multifiliis*

The results obtained from the study showed that the parasite *Poecilasmatidae* (**Figure 4**) was only found in the Sei Kepayang area and was found in the swimming legs with a prevalence of 31% and 2 int/bird. *Poecilasmatidae* found oval in shape, has antennules, early juvenile, thorax vestige, cyprid compound eye and cirri vestiges protected by a shell. This ectoparasite is temporary because in the larval phase it is a group of Poecilasmatidae and in the adult phase it turns into *Octolasmis sp*. This ectoparasite is one of the larval stages of organisms of the type of shellfish or barnacles that are temporary that *Poecilasmatidae* is the larval stage of *Octolasmis sp.* who live as barnacles.

Figure 4. *Poecilasmatidae*

e. Carchesium sp

After conducting research, *Carchesium sp* (**Figure 5**) it was found in new Pematang area with a prevalence of 17% and int/tail in the swimming leg. Meanwhile, in the Sei Kepayang area, the prevalence was 31% and 4 int/head were found in the gills. *Carchesium sp* that was found was shaped like a bell flower, had cilia and was seen as a colony where one colony had more than 3 individuals. This is reinforced by Kabata (1985) that *Carchesium sp* is an ectoparasite that can live in colonies. Based on observations, colonies of *Carchesium sp* can move and roll when stimulated by several individuals in one colony.

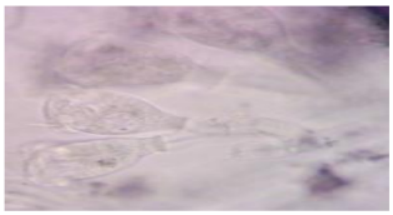

Figure 5. *Carchesium sp*

Zoothamnium sp ectoparasites (Figure 6) in the marine silo area were found in the carapace section with a prevalence of 40% and 6 int/head, in the embankment area it was found in the swimming leg with a prevalence of 17% and 19 int/fish. *Zoothamnium s*p has a body shape like an inverted bell, is contractile, lives in colonies with many branches on each stalk, and is transparent in color.[11].

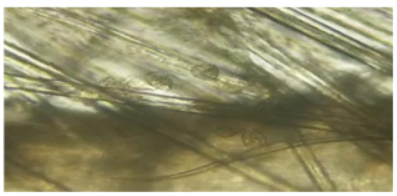

Figure 6. *Zoothamnium sp*

3.5 Water quality parameter measurement

The results of measurements of several water quality parameters that are estimated to affect the number of mangrove crab catches and the level of ectoparasite infection in mud crabs in the marine silo, Pematang Baru, and Sei Kepayang areas include temperature, pH, and salinity. The results of temperature measurements at each station showed that the temperature ranged from 29-31°C. This is in accordance with the statement of [13] which states that the optimal temperature for the life of mud crabs is in the range of 25-35 °C. The results of salinity measurements at each station obtained salinity results ranging from 20-25‰. This is in accordance with the statement of [13] which states that a good salinity for the life of mud crabs is 10-25‰. The pH measurement value at each station showed that the pH ranged from 7-8. This is in accordance with the statement of Shelley and Lovatelli (2011) which states that a good pH for the life of mud crabs is 7.5-9.0. Good water quality supports the life of organisms[12][8][13].

4. Conclusion

Based on the results of the study, it can be concluded that the parasites that attack mud crabs in sea silos are: *Octolasmis sp, Ichtyopthyrius multifilis, Trichodina sp, Zoothamnium sp*. The parasite that attacked the new embankment was *Octolasmis sp, Carchesium sp, Zoothamnium sp,*and the parasites that attack Sei Kepayang are *Octolasmis sp, Carchesium sp, Poecilasmatidae sp, Trichodina sp*.

Acknowledgments

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