International Journal of Multidisciplinary Research and Growth Evaluation.

Prevalence and Intensity of Ectoparasites in Vaname Shrimp (*Litopenaeus vannamei*) from Pond, Bulukumba Regency

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Article Info

ISSN (online): 2582-7138
Volume: 04
Issue: 01
January-February 2023
Received: 18-01-2023;
Accepted: 07-02-2023
Page No: 535-538

Abstract
Parasitic disease is the most common disease agent found attacking vannamei shrimp (*Litopenaeus vannamei)*. This study aims to identify the type of parasite, the intensity and prevalence of the parasite in ponded vannamei shrimp in Bulukumba Regency. Vaname shrimp sampling was carried out in pond areas in Bulukumba Regency. Examination of vaname shrimp samples (*L. vannamei)* includes gills, walking legs and swimming legs. Parasites were observed using a microscope equipped with a camera at 40 × magnification. Parasite observations were carried out at the UMI Integrated Biology Laboratory. Data were analyzed descriptively by connecting the data with related previous research and then concluding. Identification of the type of parasite refers to the literature in the journal. The results showed that there were 3 types of parasites found in vaname shrimp (*L. vannamei)* ponds in Bulukumba Regency, namely *Zoothamnium* sp., *Vorticella* sp. and *Epistylis* sp. The intensity of ectoparasites found reached 9.8 ind/head while the prevalence reached 83%.

Keywords: *Litopenaeus vanname I,* Parasite Identification, Transmission rate, Attack intensity

Introduction

Vaname shrimp (*Lit openaeus vannamei)* is one of the leading aquaculture commodities in Indonesia. In the 2019 period, shrimp production achieved 517,397 tons and is targeted to increase by 250% in 2024 to 1,290,000 tons with a production value of 36.22 trillion in 2019 to 90.30 trillion in 2024 (KKP, 2020). The amount of shrimp exports in Indonesia in 2018 reached 197.43 thousand tons with a value of USD 1,742.12 million (DJPB, 2019).

Bulukumba Regency is one of the areas in South Sulawesi which is currently a center for the development of vaname shrimp cultivation. Initially, the pond was a type of habitat that was used as a place for brackish water aquaculture activities located in coastal areas. The use of ponds in general is more dominant for shrimp farming activities (Riani *et al*., 2012) [15]. In line with the development of the shrimp farming business, the application of both traditional, semi-intensive to intensive cultivation systems in vannamei shrimp farming activities causes a decrease in the quality of maintenance water in ponds, causing a series of diseases that cause huge losses to vannamei shrimp cultivators.

Some research results show that the parasite commonly found in shrimp ponds, both vaname shrimp and tiger shrimp, is *Zoothamnium* sp. *Epistylis* sp. and *Vorticella* sp. (Scientific *et al*., 2022; Rosnidar *et al*., 2018) [16]. This type of ciliate class parasite infects shrimp with a prevalence value of 50% and an intensity of 41 ind/head in the moderate category (Scientific *et al*., 2022). While Rosnidar *et al*. (Rosnidar *et al*., 2018) [16] also conducted a study on the type of tiger prawns which also obtained the same type of parasite, namely *Zoothamnium* sp, *Epistylis* sp. and *Vorticella* sp. with a prevalence reaching 70.6 - 91%. The target organs for this parasite attack are the gills and swimming legs. Parasite attacks on the walking legs of the shrimp make it difficult for the shrimp to walk, while parasitic attacks on the gills cause difficulty breathing, the gill covers expand with the gills turning pale in color on the gill sheets (Margaretha, 2011) [11].

Some results of research on parasite identification have been carried out in several areas (Novita & Ferasyi, 2016; Rosnidar *et al*., 2018) [16, 12], however, there is no information about the types and levels of parasite attack on vannamei shrimp in pond areas in Bulukumba Regency, so this research is necessary done.

Therefore this study aims to examine the type of parasite, the level of attack and the intensity of parasitic attacks on vannamei shrimp in Bulukumba Regency, Indonesia.

Research methods

This research was carried out from January to March 2021 at the Integrated Biology Laboratory, Faculty of Fisheries and Marine Sciences, Indonesian Muslim University. Vaname (*L. vannamei)* research samples were obtained from several farmer ponds in Ujung Loe District, Bulukumba Regency.

The sampling stage was carried out directly and randomly (*random sampling*) from the location and then put it in a plastic container filled with oxygen. Observations *of* parasites in samples included fish organs such as gills, mucus, walking legs and swimming legs.

The parasite identification method in vannamei shrimp (*L. vannamei)* was carried out microscopically (Mahasri & Kismiyati, 2008) [10]. Before taking the sample organ to be observed, the shrimp is opened on the gill cover using scissors. Next, the gills were placed on the slide and identified. The same thing was done on samples of swimming legs, walking legs, tail and internal organs, cut and placed on *a glass object*. Identification of ectoparasites was carried out with the help of a microscope at 100 - 400 × magnification. Identification of the type of ectoparasites refers to the Handbook *of Fish Diseases* (Dieter, 1989; Kabata, 1985) [2, 8].

The main parameters observed were the type of parasite that attacked, the level of prevalence and the level of intensity of the parasite attack. The data in the form of identification of parasites at the research location will be observed descriptively, while the data from the prevalence and intensity calculations will be in tabular form. The formula used in calculating prevalence and intensity levels is based on the Kabata (1985) formula [8].

$$\text{Prevalence (P)} = \frac{\sum \text{infected shrimp}}{\sum \text{shrimp examined}} \times 100\%$$

$$\text{Intensity (I)} = \frac{\sum \text{infected parasites}}{\sum \text{infected shrimp}}$$

Determination of parasitic infection categories based on prevalence and intensity can refer to Williams & Williams (1996) [18].

Table 1: Criteria prevalence infection parasite

No	Attack Rate	Information	prevalence
1	Always	Very severe infection	100-99 %
2	Almost always	Severe infection	98-90 %
3	Usually	Moderate infection	89-70 %
4	Very often	Very frequent infections	69-50 %
5	Generally	Common infection	49-30 %
6	Often	Frequent infections	29-10 %
7	Sometimes	Infection sometimes	9-1 %
8	Seldom	Rare infection	>1-0.1 %
9	Very rarely	Infections are very rare	>0.1-0.01 %
10	Almost never	Never infection	>P0,01 %

Table 2: Criteria intensity parasitic infection

No	Infection Rate	Intensity (ind/tail)
1	Very low	<1
2	Low	1-5
3	Currently	6-55
4	Critical	51-100
5	Awfully	>100
6	Super infection	>1000

Results and Discussion

Parasite Identification

Based on the results of parasite examination on vannamei shrimp (*L. vannamei)* found 3 types of parasites in the ponds of Bulukumba Regency, namely Zoothamnium sp., Vorticella sp., and Epistylis sp. The three parasites belong to the Ciliata class, using vibrating hairs to move. The parasite identified in vannamei shrimp (*L. vannamei)* was found on walking legs, swimming legs, tail and mucus.

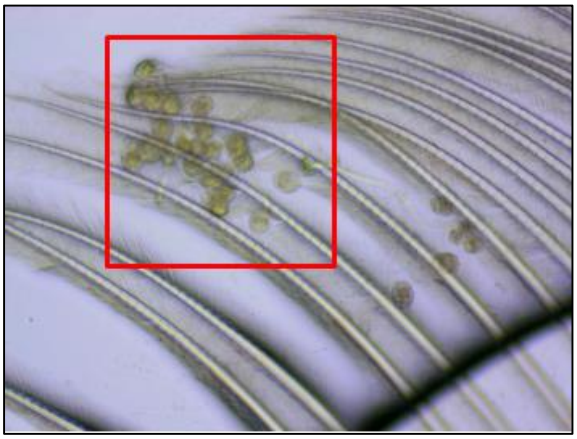

Fig 1: *Zoothamnium* sp. who invests vanname (*L. vannamei)*

Zoothamnium sp. has a body size of 50 -70 µm, lives in colonies, is clear (whitish) in color and is contractile like an explosion. *Zoothamnium* sp. found in the sample has a rounded shape at the top and conical at the bottom. This parasite is easy to grow in conditions of high organic matter. Shrimp infected with *Zoothamnium* sp. will experience disturbances in shrimp movement, difficulty eating, swimming, and the moulting process because the whole body is filled with attached organisms (Afrianto *et al*., 2015) [1].

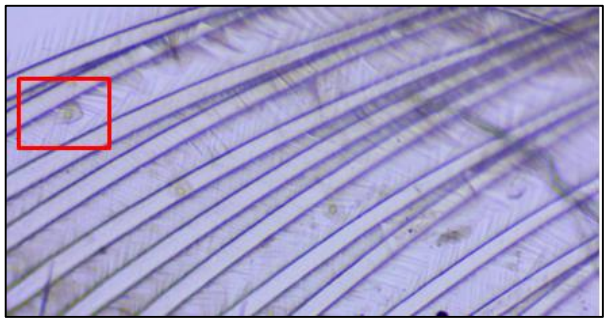

Fig 2: Ectoparasite *Vorticella* sp. who invests vanname (*L. vannamei)*

Ectoparasite *Vorticella* sp. has a shape almost similar to *Zoothamnium* sp. like an inverted bell, transparent color, contractile, living solitary, stemmed but not branched (Rahmi, 2012) [14]. This parasite is ectokomensal, namely a parasite, namely a parasite that lives in the body of another organism of a different type and gets food from its host without any compensation. Parasites *Vorticella* sp. can be found around the gill organs of crabs, swimming legs, abdomen, gills and body surfaces of shrimp (Susilo *et al*., 2018) [17]. This parasite measures 35-120 µ m. *Vorticella* sp. has no branches and does not form colonies (Istiqomah, 2019) [7]. Shrimp infected with *Vorticella* sp. can interfere with shrimp movement, difficulty eating, swimming, and the

moulting process because the whole body is filled with attached organisms (Afrianto *et al*., 2015) [1].

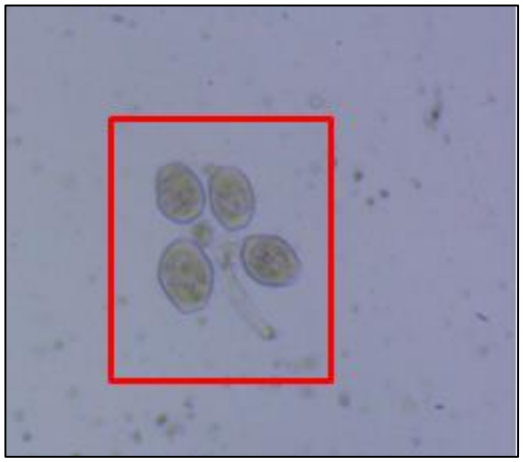

Fig 3: Ectoparasite *Epistylis* sp. who invests vanname (*L. vannamei)*

Based on figure 3, *Epistylis* sp. found in the mucus of the vannamei shrimp (*L. vannamei)* looks colonial, has the shape of a flying balloon, has sessile and has several zooids in one stalk but is not contractile. According to Hardi (2015) [5], this parasite infection has a very broad impact. Infected host cells cause hyperplasia and promote bacterial, fungal and other parasitic infections. *Epistylis* sp. known to infect the head, abdomen, gills and skin of the host. The infected hosts experience a decrease in appetite, the shrimp swim sluggishly and irregularly, have difficulty breathing, the body color is darker and slimier, and the skin and gills are grayish-white (Hardi, 2015) [5].

Prevalence

Shrimp prevalence describes the percentage of hosts infected with parasites in an area. The prevalence rate of the vannamei shrimp parasite (*L. vannamei)* in the ponds of Bulukumba Regency can be seen in table 3.

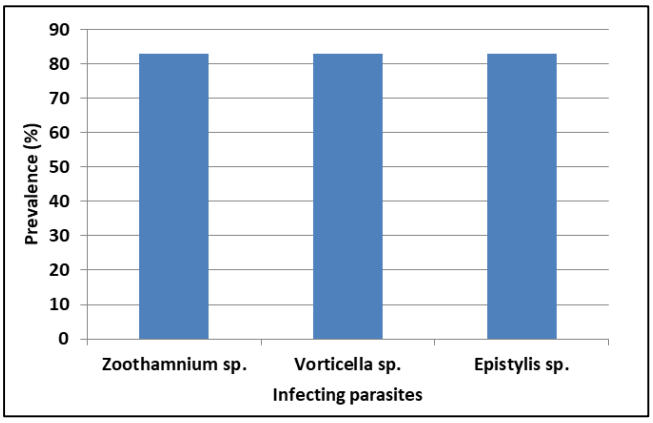

Fig 4: Prevalence of parasites on vaname (*L. vannamei)*

The results of the prevalence values in Figure 4 show that all parasites that infect vaname (*L. vannamei)* in ponds in Bulukumba Regency reach 83%. According to Williams & Williams (1996) [18], the prevalence of the three ectoparasites that invest vaname (*L. vannamei)* is classified as a normal attack level or moderate infection. The results of research by Farras *et al*. (2017) [3] showed that the prevalence value of the vannamei shrimp parasite (*L.vannamei)* in Gresik Regency reached 57.5%. Likewise, the prevalence value of ectoparasites in the ponds of Pati Regency reaches 85% (Putra *et al*., 2018) [13].

Intensity

The intensity value describes the number of parasites found divided by the number of infected fish. The intensity value of the vannamei shrimp parasite (*L. vannamei)* on pond shrimp in Bulukumba Regency can be seen in the diagram in Figure 5.

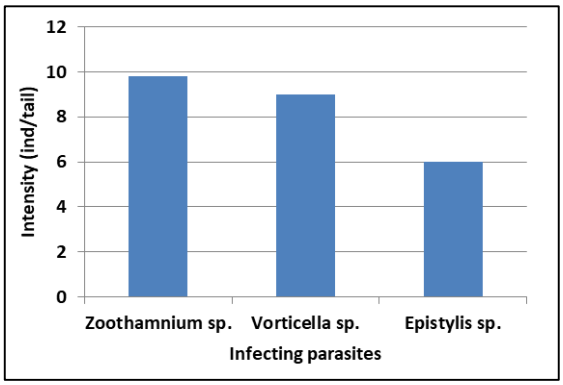

Fig 5: Parasite Intensity on vaname (*L. vannamei)*

Based on Figure 5, it can be seen that the intensity value of the parasite that infects shrimp is highest in the parasite *Zoothamnium* sp. (9.8 ind/head) and the lowest was in *Epistylis* sp (6 ind/head). According to Williams & Williams (1996) [18], the value levels of 6 and 9.8 ind/head are still in the moderate category because they range from 6-55 ind/head. This value does not show clinical symptoms. The results of the study (Firdaus & Ambarwati, 2019) [4] showed an intensity value of 111.56 ind/head (very severe category) but still showed no clinical symptoms.

Several factors determine the prevalence and intensity of parasites in shrimp, including size. The larger the size of the shrimp, the higher the prevalence and intensity. This is in accordance with a study of parasites that attack keling fish reported by Muchlisin *et al*. (2014) and parasites that attack banana shrimp reported by Novita *et al*. (2016) [12]. Larger shrimp have a larger surface area so that the number of parasites can also increase (Arifuddin *et al*., 2003).

Another factor that determines the level of prevalence and intensity is the age of the shrimp. The older the host, the prevalence and intensity can increase because it has longer contact with the parasite (Ohoilun, 2022). The number of infecting parasites can also be determined by the type of food consumed by the host (Arpia *et al*., 2012). Parasites prefer to inhabit host organs that provide easy-to-occupy space and easy-to-obtain food for parasite growth (Rohde, 1982).

The condition of the aquatic media for organisms also affects the number of parasite infections. Waters with high levels of organic matter are a good medium for parasite growth (Surono, 1993). An increase in organic matter can be caused by the density of shrimp in a pond. Organic matter comes from metabolic waste and uneaten feed. If organic matter cannot be decomposed, it will break down into ammonia which can disrupt the condition of the shrimp and make it easier for parasites in the infection process (Mahasri *et al*., 2019) [9]. Temperatures outside normal limits make shrimp susceptible to parasites because they affect appetite (Gufran *et al*., 2007).

Conclusion

The identification results showed that the parasites found in the vaname (*L. vannamei*) ponds in Bulukumba Regency were Zoothamnium sp., Vorticella sp. and Epistylis sp. The highest intensity value reached 9.8 ind/head and the highest prevalence reached 83%.

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