

Prevalence of Ectoparasites in Tilapia (*Oreochromis niloticus*) in Tarakan

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Abstract

Freshwater fisheries product tilapia (*Oreochromis niloticus*) has the potential to be developed and has a very high economic value, particularly in the city of Tarakan. Fish ectoparasites are a problem that frequently occurs and is discovered in aquaculture. This study aimed to determine the type of ectoparasites that infect tilapia in aquaculture ponds in Kampung Satu and Sebengkok. The technique involved collecting tilapia samples from various ponds and then transporting them to the laboratory. A total of 30 samples were taken from the container that was set up on a tray, and they were all put to death by being stabbed in the brain nerves. It was done to identify ectoparasites on the gills, eyes, scales, and fins of the fish. Two forms of ectoparasites, *Dactylogyrus sp.* and *Trichodina sp.*, which were only present in the gills, were identified in the tilapia. In the moderate infection group, the prevalence rate in Kampung Satu was 86%, and in the very frequent infection category, it was 66% in Sebengkok. In Kampung Satu, the level of ectoparasites was 3,84, which is considered low, and 8,30, which is considered medium, in Sebengkok.

Keywords: cultivation, ectoparasites, identification, intensity, tilapia

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INTRODUCTION

Freshwater fisheries product tilapia has the potential to be developed and has a significant economic value, particularly in Tarakan. Due to its third-best production behind salmon and shrimp, tilapia was named one of the most potentially valuable fisheries products in the aquaculture industry by the Department of Fisheries and Cultivation at the Food and Agriculture Organization (FAO) (Irwandi *et al.*, 2017). Tilapia has a number of benefits, such as being simple to cultivate, growing quite quickly, easy to breed, naturally euryhaline, and resistant to negative environmental factors (Koniyo *et al.*, 2020). However, there are certain issues with tilapia fish farming, including disease. Fish disease is a frequent issue that exists in aquaculture (Ali *et al.*, 2013). Parasites are one of the disease agents that frequently afflict farmed fish in water.

Parasites are organisms that can contaminate their hosts and spread disease by consuming their resources. The survival of cultured fish will be impacted by parasites, which can kill fish or stunt

their growth (Cahyadi *et al.*, 2019). Parasitic infections can damage organs and disturb the body's metabolic process to the point that growth is hampered, fish experience stress, and even death can result (Nofyan *et al.*, 2015). Ectoparasitic and endoparasitic parasites can be distinguished. Ectoparasites are parasites that dwell on the exterior of an organism's body, such as its gills, fins, scales, or eyeballs, as opposed to endoparasites, which are parasites that live inside an organism's body (Ali *et al.*, 2013).

Ectoparasite infections can result in losses in farmed fish, albeit they do not have as great an impact as losses brought on by viruses and other bacterial and viral illnesses (Wulandari *et al.*, 2019). Ectoparasites must still be avoided, though, as they might contribute to infection, which is also risky. Ectoparasite infections result in losses such as heightened stress sensitivity, harm to external organs, and lower marketability (Putri *et al.*, 2016). The purpose of the study was to determine the type of ectoparasites that infect tilapia in different aquaculture ponds. Because of the significant impact caused by ectoparasite infection, it was necessary to conduct research on

the identification of ectoparasites in tilapia with a comparison of various locations.

MATERIALS AND METHODS

Samples

In order to represent Tarakan, tilapia were sampled through purposive sampling in the areas of Kampung Satu and Sebengkok. Fish that were captured had to be between 12–18 centimeters long and no older than two months old. The total number of samples taken was 30, with 15 samples collected from Kampung Satu and 15 samples collected from Sebengkok. The samples were then stored in Styrofoam that had been filled with water and transported to the laboratory.

Parasite Monitoring

Scales, eyes, gills, and fins were examined for parasites in fish samples in the following methods: (1) a sample of gills was taken and placed in a glass object, then dripped with distilled water and mashed, then examined under a microscope; (2) the fish's body fins were cut and placed on a glass object, then the fins were scraped thin and then dripped with distilled water, then the fish's scales were examined for parasit; (3) fish scales were collected, put on a glass surface, wetted with distilled water, and examined under a microscope; (4) fish eyeballs were removed with the use of tweezers and scissors, set on a glass surface, dripped with distilled water, and then examined under a microscope.

Parasite Identification

The scales, fins, gills, and eyes of tilapia were examined to investigate ectoparasites in their natural habitat. The book Protozoan Parasites of Fishes in the Fish Quarantine Center, Quality Control and Safety of Fishery Products, Tarakan City, was used to determine the type of parasite.

Prevalence and Intensity Quantification

Prevalence is the proportion of fish that are parasite-infested out of the total fish examined. Following is the prevalence formula (Kabata, 1985): $P = (N/n) \times 100\%$, which is "P" stands

for Prevalence, "N" for the number of infected fish, and "n" for the number of samples observed. Furthermore, prevalence was determined according to the following categories i.e., 99–100% highly severe infection, 90–98% severe infection, 70–89% moderate infection, 50–69% very frequent infections, 30–49% common infection, 10–29% frequent infections, 1–9% infection sometimes, 0,1–1% rare infection, 0,01–0,1% infections are very rare, < 0,01 never infection.

The intensity of fish parasites was calculated as the number of infecting ectoparasites for each examined sample (Kabata, 1985): $I = P \times N^{-1}$, which is "I" stands for intensity of parasite infection, "P" for the number of parasites infection, and "N" for the number infected with parasites. Furthermore, intensity was determined according to the following categories i.e., < 1 very low, 1–5 low, 6–50 currently, 51–100 critical, > 100 awfully, > 1.000 superinfection.

Water Quality Evaluation

Measurements of dissolved oxygen (DO), pH, temperature, and ammonia (NH₃) in aquaculture ponds were performed when sampling tilapia, which was done both in situ and ex situ.

Data Analysis

Data were tabulated and presented descriptively.

RESULTS AND DISCUSSION

The results of the identification of ectoparasites in tilapia revealed the presence of two different types of ectoparasites infected tilapia in the aquaculture ponds of Kampung Satu and Sebengkok (Table 1). Figure 1 shows the ectoparasites found in tilapia, *Dactylogyrus sp.* and *Trichodina sp.* The gill organs were dwelling to both parasites.

Two varieties of ectoparasites, *Dactylogyrus sp.* and *Trichodina sp.*, were discovered as a consequence of observations performed at Kampung Satu and Sebengkok. While 10 samples were contaminated at the Sebengkok location, 13

Table 1. Distribution of ectoparasite infections

Location	Samples	Infected organs	Infected samples	Type of ectoparasite	Total
Kampung Satu	15	Gills	13	<i>Dactylogyrus sp.</i>	11
				<i>Trichodina sp.</i>	2
Sebengkok	15	Gills	10	<i>Dactylogyrus sp.</i>	10

Table 2. Ectoparasite prevalence

Location	Samples	Infected samples	Prevalence	Prevalence category
Kampung Satu	15	13	86%	Moderate infection
Sebengkok	15	10	66%	Very frequent infections

Table 3. Ectoparasite intensity

Location	Samples observed	Infected samples	Number of parasitic infections	Intensity	Information
Kampung Satu	15	13	50	3,38	Low
Sebengkok	15	10	83	8,30	Currently

Table 4. Water quality parameter evaluation

Location	Parameters			
	Temperature	pH	DO	Ammonia
Kampung Satu	28	8,7	2,5	0,1
Sebengkok	30,2	6,7	3,5	0,1

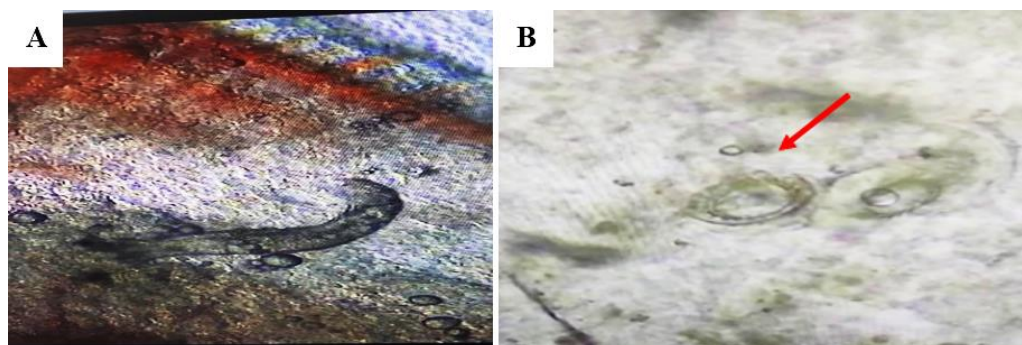


Figure 1. Parasites in tilapia. (A) *Dactylogyrus sp.* (B) *Trichodina sp.*

samples were used at the Kampung Satu location and were infected with ectoparasites. Since it only employs one filter and results in ectoparasitic infections, it is thought that this difference is caused by the different and less sterile water exchange system. According to a study (Manurung and Gaghenggang, 2016), the more fish are stocked per area in aquaculture ponds, the more friction there is between the fish, which can lead to the transmission of ectoparasites. Even if the prevalence of parasite infection is fairly high, the clinical symptoms have little impact. This is caused by typical aquatic conditions, which result in a healthy degree of fish body resistance. This was supported by a research (Trujillo et al., 2021)

which found that parasite illnesses had less of an impact on tilapia activity than did water quality conditions.

The gill organs in this investigation had *Dactylogyrus sp.* infection and were a light reddish tint (Figure 1). Fish gills are frequently attacked by *Dactylogyrus sp.*, which might cause this to happen. Gills are extremely susceptible to attack by parasitic ectoparasites since they are respiratory organs in fish that are directly associated to water (Kurnia et al., 2019). In addition, the study (Handayani 2020) discovered that the gills are infected by the ectoparasite *Dactylogyrus sp.*

Trichodina sp., which are only found in Kampung Satu, are the ectoparasites that infect tilapia. This is probably because they infect a lot of freshwater fish. According to a study (Maulana *et al.*, 2017) that found ectoparasites in betok fish, a type of freshwater fish that is parasitized by *Trichodina sp.* Additionally, ectoparasites *Trichodina sp.*, were discovered in a study (Kurnia *et al.*, 2019; Fikri *et al.*, 2022) that identified parasites in tilapia.

Figure 1 shows the findings from observations of parasites of the *Trichodina sp.* The denticles are sharply curved, protruding on the anterior side and tapering on the posterior, and the body is encircled by a membrane border. The adhesive center produces dots, and the membrane border surrounds the entire structure (Nofyan *et al.*, 2015).

According to a study (Ali *et al.*, 2013), tilapia infected with the parasite *Trichodina sp.*, develop feeble, dull, and pale bodies, produce large amounts of mucus, and have decreased appetites, which causes the fish to become skinny (Fikri *et al.*, 2020). Additionally, *Trichodina sp.*, infection impairs or suppresses the immune system, which increases the risk of death. This occurs as a result of fish producing too much mucus, which interferes with the oxygen exchange process because it coats the walls of the gill lamellae.

The research and computation of the prevalence of tilapia ectoparasites in various areas revealed a high infection, as shown in Table 2. With a prevalence value of 86%, 13 people were found to be infected with ectoparasites according to the analysis of the Kampung Satu location study, which used a sample size of 15 individuals. This value indicated the category of moderate infection, meaning that the prevalence of fish infected with ectoparasites at that location was high. Fish from the Sebengkok location were moderately infested with 10 ectoparasites, with a prevalence value of 66% in the category of very frequent infection. This is most likely caused by high stocking densities and water turnover. According to research by Alimuddin *et al.* (2022), the high incidence is significantly impacted by water quality, which can have an impact on physiologic and metabolic processes. In addition

to the great prevalence, parasite infection is not accompanied by any outward abnormality or clinical signs (Rifai *et al.*, 2022).

Table 3 displays the results of determining the level of ectoparasites in tilapia at two different sites, which revealed a quite high infection. The analysis of the intensity of ectoparasites in tilapia revealed that the Kampung Satu location had 3,84, in the low category, while the Sebengkok location had 8,30, in the medium category, of parasitic attacks. The tilapia location 2 had the highest ectoparasite intensity rating, 8,30, which was in the middle range. This may be brought on by the severity of the sickness, which depends on the kinds and numbers of fish-infecting bacteria, the environment, and fish immunity. Environmental factors and nutrition appropriate for life can have an impact on the prevalence and intensity of ectoparasites (Aris *et al.*, 2018). Additionally, rain can have an impact on how intense ectoparasites are (Paremme and Salosso, 2018). The size of the fish also affects the amount of ectoparasites (Ariyanto *et al.*, 2019; Hardiansyah and Lamid, 2022).

Water quality test findings are used as study supporting information. Temperature, pH, DO, and ammonia were among the water quality characteristics that were measured (Table 4). Measurements of the water quality were made to ascertain the viability of the aquaculture pond water during the investigation. The quality of the aquaculture ponds in 2 different locations is deemed feasible for the cultivation of tilapia fish based on data from measurements of water quality parameters at both locations that show values that are still in the optimum range, i.e. temperature (28–30,2°C), pH (7,67–8,70), and DO (2,5–3,2 mg/l). The findings of the laboratory study showed an ammonia content of 0,01 mg/l; this number is still regarded as practical for tilapia fish farming because it is below the SNI 2009 threshold value for water quality, particularly ammonia with a value of 0,002 mg/l.

CONCLUSION

In conclusion, *Trichodina sp.* and *Dactylogyrus sp.* were the parasites that affected

tilapia in the cultivation ponds in Kampung Satu, and *Dactylogyrus sp.* was found in Sebengkok. Kampung Satu location had the greatest parasite frequency of 86%, falling under the moderate infection category, and the Sebengkok location had the highest tilapia parasite infection intensity of 8,30, also falling under the moderate category.

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