Asian Journal of Aquatic Sciences, August 2025. Vol 8, Issue (2) 252-257
e-issn: 2716-4608
p-issn: 2655-366X

IDENTIFICATION AND POTENTIAL PARASITES IN NILE TILAPIA *(Oreochromis niloticus)* CULTURED IN DOLO SUBDISTRICT, SIGI DISTRICT

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ABSTRACT

Tilapia (*Oreochromis niloticus*) is a freshwater aquaculture fish in Dolo District, Sigi Regency. This study aimed to determine the type and prevalence of parasites on tilapia. This research was conducted from June to August 2024. Fish samples were taken in 5 villages: Kota Pulu, Kota Rindau, Potoya, Tulo, and Maku, with each village location taking as many as 10 fish, then parasite examination was carried out at the Central Sulawesi Animal, Fish, and Plant Quarantine Center Laboratory. The method used was smear preparation (smear method) with the target organs being the skin (body mucus) and gills. The total number of samples examined was 50 fish with a length of 10.5-12.8 cm and a weight of 30-43g. The results of parasite identification found nine types of ectoparasites that infect Tilapia, namely *Trichodina* sp, *Dactylogyrus* sp, *Uronema* sp, *Oodinium* sp, *Gyrodactylus* sp, *Chilodonela* sp, *Vorticella* sp, *Chlorosoma* sp, *Apiosoma* sp, and *Chichlidogyrus* sp. The highest prevalence in Tilapia was in *Dactylogyrus* sp parasites at 70%, *Trichodina* sp at 28%, and *Gyrodactylus* sp at 2%.

Keywords: Ectoparasites, *Oreochromis niloticus*, Dolo District

1. INTRODUCTION

Tilapia (*Oreochromis niloticus*) is one type of freshwater fish widely cultivated in Indonesia. This fish is in demand because of its high protein content of 16.79 g and low-fat content of 0.10 g in 100 g of fish meat[1]. This type of fish is up-and-coming in aquaculture because it can adapt to high salt levels and has a high tolerance to environmental changes[2]. However, according to Suhermanto et al.[3], freshwater fish farming systems are inseparable from biological risks, including the emergence of various diseases. As the intensity of cultivation increases, the prevalence of diseases that infect fish also tends to increase[4]. Sari[5] added that less-than-ideal aquatic environmental conditions, such as high fish density, overfeeding, and low water quality, can cause stress in fish. Stress is a disturbance to the homeostasis of the fish's body, which triggers an adaptive response and ultimately opens up opportunities for disease. Stressful conditions experienced by fish due to a non-optimal aquaculture environment can also increase susceptibility to parasitic infections.

Parasites are one of the main causes of disease in fish and can cause death. Parasites live by relying on their host (fish), and often have a negative impact on the host because they take nutrients without providing mutual benefits. Based on their location, parasites can be divided into two types, namely ectoparasites and endoparasites[6].

Received: 17 June 2025
Accepted: 15 July 2025

Ectoparasites attack the outside of the fish's body, such as fins, mucus, scales, and gills, while endoparasites attack internal organs, such as the digestive tract and blood. Fish parasites live and reproduce in the fish's body and utilize it as a host[7].

Parasites can live in the host by taking nutrients from the host's body, which in the long run can cause a decline in health conditions, leading to fish death[8]. Parasites absorb nutrients from the host's body, which in the long run can cause a decrease in health conditions and even fish death. Rosita & Gunawan[9] emphasized that disease in fish occurs due to interactions between the host, pathogenic organisms, and the environment that does not meet water quality standards. Pond conditions with excess feed can accelerate the development of parasites and result in unhealthy environmental changes, which ultimately reduce the fish's immune system. In this case, the fish as a host is a source of nutrients and a place to live for parasites.

Based on this description, it is crucial to identify and analyze the prevalence and level of infection (parasite intensity) in tilapia. This information is needed to support disease prevention and treatment efforts, so that the productivity of tilapia farming can run optimally. This study aims to determine the type and prevalence of parasites in tilapia.

2. RESEARCH METHOD

Time and Place

This research was conducted from June to August 2024. Tilapia samples were taken from five locations: Pulu Village, Rindau Village, Potoya Village, Tulo Village, and Maku Village.

Method

The method used was a descriptive survey to describe the symptoms and obtain factual information from a particular group or region[10]. Sampling was carried out randomly (random sampling) according to the procedure, with the target organs being the fish's skin (mucus) and gills. The number of samples observed was 50 fish. Ectoparasites were identified and observed at the Central Sulawesi Animal, Fish, and Plant Quarantine Center Laboratory.

Procedures

Examination of mucus on fish skin is done by grinding on the fish's body from head to tail. The mucus obtained was then mixed with one drop of distilled water and observed under a microscope. For gill examination, the gills of the fish are first cut so that the gill leaves can be seen clearly. The gill leaf that had been taken was placed on a glass object, then dripped with physiological saline solution and observed using a binocular microscope. The identification of parasites is based on morphology and refers to the identification guide by Kabata[11]. Parameters observed include parasite type, prevalence, and infection intensity. The infection rate can be calculated using the formula according to the following:

$$\text{Prevalence (\%)} = \frac{\text{Number of fish exposed to parasites}}{\text{Number of fish inspected}} \text{x } 100$$

Water Quality

Water quality parameters were measured simultaneously when sampling fish. Parameters measured include temperature, dissolved oxygen (DO) levels, and water pH.

3. RESULT AND DISCUSSION

The types of ectoparasites found in this study were *Dactylogyrus* sp, *Trichodina* sp, and *Gyrodactylus* sp. Based on the identification results, *Dactylogyrus* sp ectoparasites were found in 35 fish samples, *Trichodina* sp in 14 samples, and *Gyrodactylus* sp in 1 fish sample. The results of parasite identification in Dolo District can be seen in Table 1.

Dactylogyrus sp parasite was the most common type of ectoparasite found in all five sampling sites, with a prevalence of 70%. Jalali & Barzegar in Sudaryatma & Eriawati[12] stated that *Dactylogyrus* sp is generally found in intensively managed freshwater and lives in the respiratory tract of fish. Tilapia infected with *Dactylogyrus* sp can experience damage to the gill tissue, such as hyperplasia of the secondary lamellae. The data obtained is in line with the findings of Jalali & Barzegar[13], which states that *Dactylogyrus* sp has an adult body size between 0.2 and 2 mm. On the anterior part of the body, there are two small dots resembling eyes, while on the posterior part, there are two large hooks and fourteen small hooks that attach the parasitic body to its host[14].

Table 1. Results of parasite identification in Dolo Sub-district

Kota Pulu Village	Tulo Village	Rindau	Potoya Village	Maku Village
Trichodina sp	*Uronema* sp	*Dactylogyrus* sp	*Dactylogyrus* sp	*Dactylogyrus* sp
Uronema sp	*Chilodonela* sp	*Chichlidogyrus* sp	*Gyrodactylus* sp	*Trichodina* sp
Dactylogyrus sp	*Vorticella* sp		*Trichodina* sp	*Oodinium* sp
Gyrodactylus sp				*Chilodonela* sp
Oodinium sp				
Chilodonela sp				
Apiosoma sp				

Dactylogyrus sp is an ectoparasite that attacks the gills of freshwater fish and can also be found in brackish and saltwater environments. This parasite has two small dots resembling eyes on the anterior part of its body. In the posterior part, there is a special structure in the form of two large hooks and fourteen small hooks that allow this parasite to attach tightly to the fish's gill tissue[15].

Trichodina sp has a round body, slightly concave in the center, with a diameter between 50-100 µm, and sometimes can reach more than 400 µm. A membrane surrounds the body's surface, while the center resembles a sticky scratch. These parasites also have toothed, ring-like structures known as cilia and oral discs, which serve to attach to the host's body. The teeth on the anterior part are sharply curved, protruding forward, and narrowing towards the back. *Trichodina* sp is a cosmopolitan parasite found in various types of water. Infection from this parasite can cause health problems for fish and potentially spread to surrounding waters widely[6] (Figure 1).

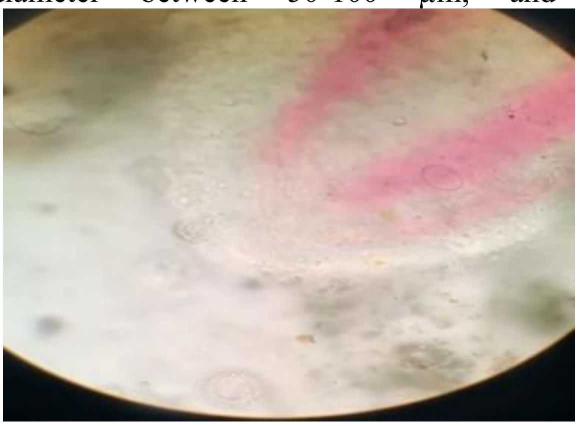

Figure 1. *Trichodina* sp

Figure 2. *Gyrodactylus* sp

Gyrodactylus sp is a small, elongated ectoparasite with a transparent body without eye spots. The parasite has two protrusions on the anterior part, and the posterior part is equipped with an anchor structure (opisthaptor) consisting of several large hooks connected to the base plate and sixteen small hooks on each side. In the adult phase, the uterus of this parasite contains embryos that also have anchors on the front and back of the body, indicating the ability of *Gyrodactylus* sp to reproduce

e-issn: 2716-4608
p-issn: 2655-366X

viviparously and produce new generations successively in the body of the parent.

According to Ayu et al.[6], fish infected with *Gyrodactylus* sp show symptoms of a thin body, abnormal swimming movements (jerky), damage to the gills, and a dull-looking skin color. This parasite obtains nutrients from its host using suction devices and anchors embedded in the host tissue, causing cellular damage around the area where it is attached. Hooks and suction devices directly damage the fish's gill tissue on the opisthaptor (Figure 2).

Disease prevalence is the percentage of fish infected with parasites compared to the number of samples examined. Based on the observation results, the highest prevalence in tilapia was in the parasite *Dactylogyrus* sp at 70%, *Trichodina* spat 28%, and *Gyrodactylus* sp at 2% (Figure 3).

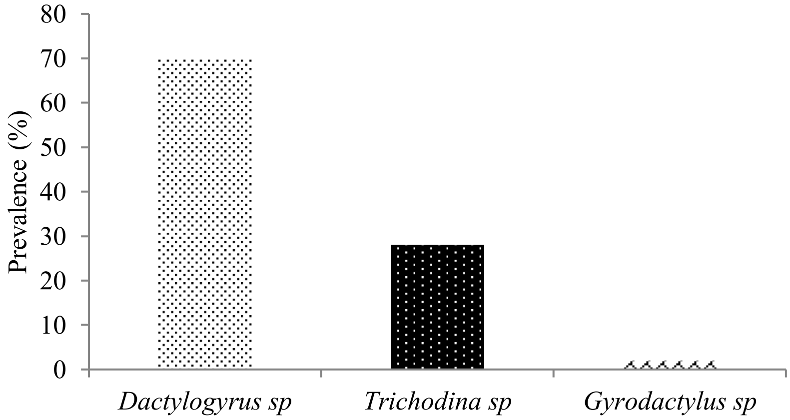

Figure 3. Parasite prevalence

Various factors, including high stocking density, insufficient nutrient intake, and low water quality parameters, can compromise fish health. High density in aquaculture ponds increases the risk of direct contact between fish and the aquatic environment, increasing the chance of parasitic infection. Physical friction between fish due to the density can cause wounds, which become an entry point for pathogenic organisms and cause secondary infections[16].

The level of parasitic infection in fish is generally assessed through prevalence and intensity parameters. Prevalence is calculated as the proportion of infected fish to the total number of fish examined and expressed in percent (%), while intensity indicates the number of parasitic individuals per infected fish[17].

Host body size is also an important factor influencing variations in prevalence values and intensity of parasite infection. Parasites can enter aquaculture ponds through water and air, aquatic plants, objects, and animals around the aquatic environment[16]. High stocking densities, such as those found in tilapia ponds in Hiung Village, Manganitu District, can potentially cause stress in fish due to intense physical contact. This condition increases the chance of infection and the spread of parasites. Irianto[15], stated that fish populations that are too dense can facilitate the transmission of parasites from sick fish to healthy fish. Therefore, if the condition of the aquatic environment is not managed correctly, the potential for the emergence of parasites will be higher and can adversely affect the success of tilapia aquaculture production.

Water quality data were also collected to determine the condition of the water in the tilapia pond. This data can be used as a parameter for parasite attacks on the host. Good water quality will affect the prevalence and intensity of parasites. Conversely, poor water conditions cause parasite intensity and prevalence to increase. Water quality data available at the three tilapia aquaculture sites showed results per quality standards. The water quality data obtained from five villages, namely Pulu with a temperature of 31°C, pH 6 and DO 5 mg/L, Rindau with a temperature of 29℃, pH 7 and DO 2 mg/L, Potoya with a temperature of 25℃, pH 7 and DO 3 mg/L, Tulo with a temperature of 28.5℃, pH 6 and DO 2 mg/L, and Maku with a temperature of 30℃, pH 6 and DO 3 mg/L for the five locations are still at optimal levels.

The normal pH value for fish life in natural waters and suitable for aquaculture activities ranges from 6.5 to 9. The pH of the water increases during the day and decreases at night[18]. Temperature conditions in the five fish ponds showed values between 28-31°C. Low temperatures will reduce immunity, while high temperatures can accelerate bacterial infections. The optimum temperature range for fish farming activities is 20-30°C[19].

4. CONCLUSION

Based on the identification results, ectoparasites infecting tilapia in the aquaculture area of Sigi Biromaru District consisted of *Dactylogyrus* sp, *Trichodina* sp, and *Gyrodactylus* sp. Among the three types, the parasite with the highest prevalence was *Dactylogyrus* sp, which was found in 70% of the tilapia samples. This ectoparasite infection indicates that the aquatic environment and aquaculture management in the location are not optimal, thus supporting the development of parasites.

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