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The prevalence and intensity of ectoparasites that infects tilapia (*Oreochromis niloticus*) in floating net cages

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ABSTRACT

Ectoparasites which often attack tilapia include *Trichodina* sp., *Dactylogyrus* spp., *Gyrodactylus* spp., and *Epistylis* spp. This research aims to determine the types, prevalence, and intensity of ectoparasites found on tilapia (*Oreochromis niloticus*) in the floating net cages of Batanghari River, Jambi. The research was conducted from February through March 2020. A survey method is carried out through direct sampling at the study site to identify the tilapia ectoparasites. The sampling technique is done using random sampling. Ninety fish were taken for parasite inspection at the Fish Quarantine, Quality Control, and Safety of Fishery Products Class I Jambi Station. The observations found three types of ectoparasites namely *Dactylogyrus* sp., *Epistylis* sp., and *Oodinium* sp. The highest ectoparasite prevalence rate was found from the species *Epistylis* sp. with a value of 37.7% and an intensity value of 24.7 ind/fish. The prevalence of *Dactylogyrus* sp. was 26.6% and an intensity value of 1.3 ind/fish. The lowest prevalence value was from *Oodinium* sp. with a prevalence value of 7.7% and an intensity value of 3.2 ind/fish. The prevalence and intensity values of tilapia ectoparasites based on their locations were 56.6% and 23 ind/fish (station I), 50% and 18.6 ind/fish (station II) and 43.3% and 17.6 ind/fish (station III). The types of ectoparasites found on tilapia in this study were *Epistylis* sp., *Oodinium* sp., and *Dactilogyrus* sp. The parasite with the highest prevalence and intensity found during the survey was *Epistylis* sp.

Introduction

Batanghari River is the longest river in Jambi Province. The Batanghari watershed is used by the community as a fish cultivation area using a floating net cage system. The type of fish cultivated in the floating net cages is dominated by tilapia (*Oreochromis niloticus*). This cultivation aims to meet the needs of the local market in the area. In 2016, the production of tilapia was 11,020.65 tons, which decreased in 2017 to 10,995.73 tons (BPS Jambi Province, 2018). This is due to a disease that attacks the tilapia.

Fish diseases can be classified into infectious and non-infectious diseases. Infectious disease can be caused by parasites, bacteria, virus, and fungi. Whereas non-infectious disease can be caused by environmental conditions, nutrition, and genetic issues (Hardi, 2017). Disease in fish farming activities is a serious problem that is often faced by cultivators, because it causes mass mortality, tissue damage, and economic loss (Syawal *et al.*, 2008). One of the pathogens that can cause serious problems is parasite.

Based on the location of the infection, parasites that often attack fish are divided into ectoparasites and endoparasites (Ali *et al.*, 2013). Ectoparasites are one of the most common diseases that often attack tilapia (Irwandi *et al.*, 2017). The ectoparasites

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usually attach to the outer body part or gill of the fish, inhibiting their growth and even resulting in mortality (Adibrata *et al.,* 2020). The types of parasites that commonly attack tilapia include *Trichodina* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., *Argulus* sp., *Steinernema* sp., and *Epistylis* sp. (Kadrasah *et al.,* 2017; Putri *et al.,* 2018; Larasati *et al.*, 2020).

Cases of ectoparasites found in red Tilapia floating net cage aquaculture in Kapuas River, West Kalimantan were caused by *Dactylogyrus* sp., *Gyrodactylus* sp., *Trichodina* sp., *Argulus* sp., dan *Chichlidogyrus* sp. (Irwandi *et al.*, 2017). Larasati *et al.* (2020) stated that *Trichodina* sp. and *Dactylogyrus* sp. were the ectoparasites found in Tilapia in the floating net cages at East Java Province. Protozoan parasites found in carp floating net cage aquaculture at Laut Tawar Lake, Central Aceh Regency are *Trichodina* sp., *Ichtyophthirius multifiliis, Dactylogyrus* sp., *Gyrodactylus* sp., *Epistylis* sp. and *Lernea* sp. (Winaruddin and Eliawardani, 2007). Ectoparasites which often attack humpback groupers (*Cromileptes altivelis*) are protozoa from the Ciliate class, *Trichodina* sp. and *Cryptocaryon* sp. in hatchery and floating net cage (Mahasri *et al.*, 2020). Gado *et al.* (2017) also added that *Dactylogyrus, Gyrodactylus, Trichodina* and *Chilodinella* have been isolated from African catfish (*Clarias gariepinus*).

The information on the prevalence and intensity of ectoparasites found on tilapia in floating net cages at Batanghari River, Mendalo Laut has never been reported. Therefore, this research aims to determine the type, prevalence, and intensity of ectoparasites that infect tilapia in the floating net cages of Batanghari River, Mendalo Laut Jambi.

Materials and Methods

Location and time of research

This research was conducted in February-March 2020. Sampling of tilapia (*Oreochromis niloticus*) was done in floating net cages Batanghari River, Mendalo Laut, Jambi Province.

Research procedure

Sample collection

The survey method is carried out through direct sampling at the study site to identify the ectoparasite found on tilapia. The sampling technique is done using random sampling. A total number of 90 live tilapia were collected from three floating net stations in the Batanghari River (Irwandi *et al.*, 2017). The collected fish were then transferred to the Fish Quarantine, Quality Control, and Safety of Fishery Products Class I Station in Jambi for identification and observation of ectoparasites at the same day.

Examination of ectoparasite

Examination of ectoparasites was done on the tilapia's skin, fins, and gills. The retrieval of skin mucosa is done by scraping it using a spatula from the head to the tail (Ode, 2012). The skin mucosa is then observed under a microscope. Observations on fish fins were carried out by cutting fin samples from all fish, then placing them on an object glass, dripping them with physiological NaCl, and then observing them under a microscope. Similar to the examination of the fins, samples were taken from both gills, separated between the filaments and the sieve, then observed under a microscope (Winaruddin and Eliawardani, 2007). The types of ectoparasites found were observed for their morphology and then identified using Kabata (1985).

Data analysis

Prevalence

Prevalence is the number of hosts infected with one or more individuals of a particular parasite species divided by the number of examined hosts (Bush *et al.*, 1997). The prevalence formula according to Kabata (1985).

$$P = \sum \frac{N}{n} x100\%$$

Information:
P = prevalence (%)
N = Total fish that infected parasites (species)
n = Total sample (species)

Intensity

Intensity is the number of individuals of a particular parasite species in a single infected host (Bush *et al.*, 1997). Intensity shows the range from the lowest number of parasites to the highest number of parasites in a fish of a certain species. The intensity value was calculated as follows:

I = Q/N

Information:
I = intensity (ind/fish)
Q = Total parasites (ind)
N = Total fish infected by parasites (species)

Results

Based on the research that has been carried out on ectoparasites that attack tilapia in three floating net cage locations on Batanghari River, Jambi, it was found that out of the 90 sampled fish, 40 were infected with ectoparasites. The types of ectoparasites that was found consists of members of the phylum Protozoa, namely *Epistylis* sp. and

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Oodinium sp., as well as a member of the phylum Platyhelmintes, namely *Dactylogyrus* sp. (Figure 1).

Table 1. Ectoparasite prevalence and intensity based on sample location.

Sample Location	Fish Infected (species)	Total Parasites (ind)	Prevalence (%)	Intensity (ind/fish)
Stasiun I	17	391	56.6	23
Stasiun II	15	280	50	18.6
Stasiun III	13	230	43.3	17.6

Tabel 2. Ectoparasite prevalence and intensity based on type of parasite.

Species	Fish Infected (species)	Total Parasites (ind)	Prevalence (%)	Intensity (ind/fish)
Dactylogyrus sp.	24	33	26.6	1.3
Epistylis sp.	34	842	37.7	24.7
Oodinium sp.	6	26	6.6	4.3

Tabel 3. Ectoparasite prevalence and intensity that infected tilapia.

Tilapia Part	Parasites (ind)	Fish Infected (species)	Prevalence (%)	Intensity (ind/fish)
Gill	33	24	26.6	1.3
Fin	-	-	-	-
Scale	868	35	38.8	24.8

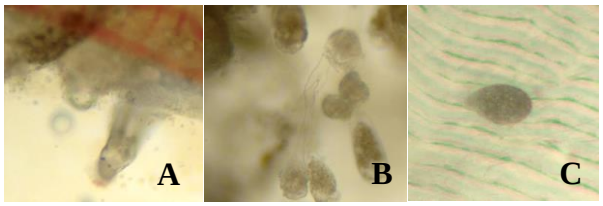

Figure 1. The ectoparasite that infected tilapia (A. *Dactylogyrus* sp.; B. *Epistylis* sp.; C. *Oodinium* sp.).

Discussion

The highest prevalence and intensity values were found at the station I (56.6% and 23 ind/fish). Whereas the prevalence and intensity at station III showed the lowest value compared to the other locations. One of the factors that may have caused the differences in the prevalence and intensity of each type of parasite is the environmental conditions that support the life of the parasites. In accordance with research conducted by Eko *et al.* (2018) on the distribution pattern of water pollution in the Batanghari River. From the results of the Batanghari River water quality analysis conducted by the Environmental Agency of Jambi City in 2018, the water quality of the Batanghari River decreases in quality from upstream to downstream, as indicated by chemical parameters that exceeds the established quality standards. This condition will result in fish becoming stressed so that there is an unbalanced relationship between fish, environment, and pathogens (parasites). Ali *et al.* (2013) stated that environmental factors such as temperature and other water physicochemical factors tend to affect the cycle of fluctuations in the prevalence and intensity values.

The parasites that most found from all stations, was *Epistylis* sp., with as many as 842 individuals, it was found to have the highest level of intensity 24.7 ind/fish with a prevalence of 37.7%. In this study, *Epistylis* sp. was found to mainly attack the scales of tilapia. It has a protease enzyme excretory organ that is used to take protein from the host's skin. This can facilitate the occurrence of secondary infection by bacteria. Williams and Williams (1996) stated that the prevalence level of *Epistylis* sp. means that it can be included in the category of general attack rate and common infection. Sarjito *et al.* (2013) stated that *Epistylis* sp. are ectoparasites that forms colonies and non-contractile or immobile. They belong to ciliates and have branches, and they settle on the skin of fish. *Epistylis* sp. is included in the types of parasites that attack freshwater fish (Adriato and Fahcri, 2014). The high prevalence and intensity of *Epistylis* sp. is affected by the high levels of organic matter around the tilapia cultivation area, as according to the statement of Nicolau *et al.* (2005) protozoan ectoparasites are usually found in areas with high organic content in the substrates and waters.

Dactylogyrus sp. is a parasite that is often found in freshwater and seawater fish (Figure 1A). It lives in the gills and belongs to Monogenea, has nail feet and an acetabulum (Putri *et al.*, 2018). This parasite has a prevalence of 26.6% which means it is included in the category of frequent attacks and infections, with an intensity of 1.3 ind/fish. Research conducted by Maulana *et al.* (2017) regarding *Dactylogyrus* sp. showed a prevalence value of 31% with an intensity of 1 ind/fish, thus the prevalence and intensity values he obtained was quite similar with this study. Fish infected with *Dactylogyrus* sp. will produce excess mucus, resulting in damage to the gills, causing the fish to die due to difficulty in breathing (Anshary, 2008). The parasite *Dactylogyrus* sp. causes serious infections in the gill filaments, so that it will interfere with the respiratory process (Chaudary *et al.*, 2017). The prevalence value on the gills reached 26.6%, which means it is included in the category of frequent infections and the intensity of 1.3 ind/fish was included in the low category.

Oodinium sp. attached to the fish by using flagella which then forms a rod that sucks into the skin and mucous membranes of the fish's body. *Oodinium* sp. causes velvet disease and infect the skin and gills of fish (Ulkhaq *et al.,* 2017). The prevalence and intensity of *Oodinium* sp. is included in the intermittent category (6.6% and 4.3 ind/fish, respectively).

Conclusion

The types of ectoparasites found on tilapia in this study were *Epistylis* sp., *Oodinium* sp., and *Dactylogyrus* sp. The highest prevalence and intensity based on the type of parasite found was from the species *Epistylis* sp.

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References

Adibrata S., M. Yusuf, C. Manullang. 2020. Ectoparasite Prevalences of Grouper Fish (*Epinephelus fuscogutatus* x *Epinephelus polyphekadion*) Cultured in Floating Net Cages. Indonesian Journal of Marine Sciences, 25(1):23-30.

Adrianto, S., M. Fahcri. 2014. Keberadaan Ektoparasit pada Ikan Mas (*Cyprinus carpio*) yang Dipelihara Dengan Perbedaan Persentase Pergantian Air. Media Akuakultur, 9(2):111-118.

Ali, S. K., Y. Koniyo, Mulis. 2013. Identifikasi ektoparasit pada ikan nila (*Oreochromis nilotica*) di danau Limboto Provinsi Gorontalo. Jurnal Ilmiah Perikanan dan Kelautan, 1(3):114-125.

Anshary, H. 2008. Modul Pembelajaran Berbasis Student Center Learning (SCL) Mata Kuliah Parasitologi Ikan. Lembaga Kajian dan Pengembangan Pendidikan (LKPP) Universitas Hasanuddin Makassar. Hal 126.

Badan Pusat Statistik Provinsi Jambi. 2018. Provinsi Jambi Dalam Angka 2018. BPS Provinsi Jambi, Jambi.

Bush, A. O., K. D. Lafferty, J. M. Lotz, Shostak, A. W. 1997. Parasitology meets ecology on his own terms: Margolis et al revisited. Journal of Parasitology, 83(4): 575–583.

Chaudhary, A., H. R. Chiary, H. S. Singh. 2017. First molecular confirmation of the *Dactylogyrus anchoratus* and *D. vastator*-(Monogenea, Dactylogy ridae) from *Carassius auratus* in western India. Research Article. Bio Invasions Records, 6(1): 79–85.

Eko, E. R., H. Syariffuddin, J. Jalius. 2018. Analisis Kualitas Air Sungai Batanghari Berkelanjutan di Kota Jambi. Jurnal Pembangunan Berkelanjutan, 1(1):123-141.

Gado, M. S. M., N. B. Mahfouz, E. M. M. Moustafa, E. E. E. Lolo. 2017. Prevalence of some ectoparasitic diseases in African catfish (*Clarias gariepinus*) at Kafr El-Sheikh governorate. International Journal of Fisheries and Aquatic Studies. 5(3): 576-583.

Hardi, E. S. 2017. Parasit Biota Akuatik (Cetakan Kedua). Mulawarman University Press, Samarinda.

Irwandi., A. H. Yanti, D. Wulandari. 2017. Prevalensi dan intensitas ektoparasit pada insang ikan nila merah (*Oreochromis* sp.) di Keramba Apung Sungai Kapuas Desa Kapur Kabupaten Kubu Raya. Protobiont, 6(1):20-28.

Kabata. 1985. Parasites and Disease Fish Culture in the Tropics. Taylor and Prancis Inc, Philadelphia.

Kadarsah, A., Muhamat, Hidayaturrahmah. 2017. Keanekaragaman jenis dan prevalensi ektoparasit pada lima jenis ikan komersial di desa sungai Batang Kecamatan Martapura Barat. Bioscientiae, 14(1):1-8.

Larasati, C., G. Mahasri, Kusnoto. 2020. Korelasi Kualitas Air Terhadap Prevalensi Ektoparasit pada Ikan Nila (*Oreochromis niloticus*) di Keramba Jaring Apung Program Urban Farming Kota Surabaya, Jawa Timur. Journal of Marine and Coastal Science, 9(1):12-20.

Mahasri, G., S. Subekti, B. B. Angghara, F. P. Pratama. 2020. Prevalence and intensity of protozoan ectoparasite infestation on nursery of humpback grouper (*Cromileptes altivelis*) in hatchery and floating net cage. Proceedings of The IOP Conference in Surabaya, Indonesia, 2019. IOP Publishing, United Kingdom, 441 012075.

Maulana, D. M., Z. A. Muchlisin, S. Sugito. 2017. Intensitas dan Prevalensi Parasit Pada Ikan Betok (*Anabas testudineus*) dari Perairan Umum Daratan Aceh Bagian Utara. Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan, 2(1):1-11.

Nicolau, A., M. J. Martins, M. Mota, N. Lima. 2005. Effect of Copper in the Protistan Community of Activated Sludge. Chemosphere, 58(5):605-614.

Ode, I. 2012. Argulus ektoparasit pada Ikan. Bimafika, 4(1):413-419.

Putri, W., F. Ayuliza., T. R. Athaillah, Ferasyi, D. Winaruddin, Alliza, Razali. 2018. Distribusi dan Prevalensi Ektoparasit pada Ikan Nila (*Oreochromis niloticus*) yang Dibudidayakan Di Karamba Jala Apung Danau Maninjau Provinsi Sumatera Barat. Jimvet, 2(4):532-537.

Sarjito, S. B. Prayitno, A. H. C. Haditomo. 2013. Buku Pengantar Parasit dan Penyakit Ikan. UPT UNDIP Press, Semarang.

Syawal, H., Syafriadiman, S. Hidayah. 2008. Pemberian ekstrak kayu siwak (*Salvadora persica* L) untuk meningkatkan kekebalan ikan mas (*Cyprinus carpio* L) yang dipelihara dalam keramba. Biodiversitas, 1(9):44-47.

Ulkhaq, M. F., D. S. Budi, G. Mahasri, Kismiyati. 2017. Identifikasi Ektoparasit pada Benih Ikan Mas (*Cyiprinus carpio*), di Balai Ikan Kabat, Kabupaten Bayuwangi. Jurnal Sain Veteriner, 35(2):197-207.

Williams. E. H. Jr., L. B. Williams. 1996. Parasites of Offshore Big Game Fishes of Puerto Rico and The Western Atlantic. Departement of Natural and Environmental Resources, University of Puerto Rico, Mayaguez.

Winaruddin, Eliawardani. 2007. The Ectoparasites Inventory on Cultured Carp in Floating Cage Net at Laut Tawar Lake Kabupaten Aceh Tengah. Jurnal Kedokteran Hewan, 1(2):66-69.

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