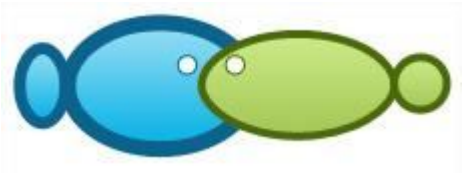

Prevalence and intensity of Nile tilapia (*Oreochromis niloticus*) ectoparasite in fish farmer group in Martapura River, South Kalimantan

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Abstract. This study aims to identify the ectoparasite and analyze the prevalence index, infection intensity, and dominance in Nile tilapia (*Oreochromis niloticus*). It used purposive random sampling-based observations on 90 individuals in 3 stations, Mandi Kapau, Awang Bangkal, and Tambela, that are lied along Martapura River, Banjar Regency. The study found 4 groups of ectoparasites, i.e. *Trichodina* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., and *Epistylis* sp. The prevalence rate of *Trichodina* sp. was 55.5% in station I, 88.88% in station II, and 85.55% in station III, respectively. *Dactylogyrus* sp. had a prevalence rate of 28.88% in station I, 43.33% in station II, and 25.55% in station III. *Gyrodactylus* sp. had a prevalence rate of 4.44% in station I, 19.99% in station II, and 7.77% in station III. *Epistylis* sp. had a prevalence rate of 2.22% in station II and 3.33% in station III. The intensity of *Trichodina* sp. was 4.91 ind fish^{-1} in station I, 22.31 ind fish^{-1} in station II, and 8.56 ind fish^{-1} in station III. *Dactylogyrus* sp. had an intensity of 1.60 ind fish^{-1}, 3.46 ind fish^{-1} in station II, and 5.09 ind fish^{-1} in station III. *Gyrodactylus* sp. had an intensity of 0.55 ind fish^{-1} in station I, 1.42 ind fish^{-1} in station II, and 0.99 ind fish^{-1}. *Epistylis* sp. had an intensity of 1.88 ind fish^{-1} in station II and 4.16 ind fish^{-1}. The most dominant ectoparasite was *Trichodina* sp. (80.71%), followed by *Dactylogyrus* sp. (13.57%), *Epistylis* sp. (4.58%), and then *Gyrodactylus* sp. (1.13%).

Key Words: identification, infection, dominance, Mandi Kapau, Awang Bangkal, Tambela.

Introduction. Nile tilapia (*Oreochromis niloticus*) is one of the cultured freshwater fish that possess good prospects for development. Nile tilapia is also one of the potential economic commodities and has increasing demand at the national or international levels. Many people like the fish due to its thick meat, good taste, and high protein content (Bagayo et al 2019).

Nile tilapia has better nutritional features than catfish (*Clarias* sp). This species contains 43.76% protein, 7.01% fat, 6.80% ash per 100 g of fish weight, whereas catfish have only 40.28% protein, 11.28% fat, and 5.52% ash (Leksono & Syahrul 2001). Nile tilapia was introduced from Africa to nearly all tropical countries worldwide (Muhotimah et al 2013). In 1969, Nile tilapia was firstly introduced to Indonesia, and since then this species has developed very fast (Lasena et al 2017). It has much superiority for development because it is omnivore, and has fast growth and strong adaptation (Ath-thar & Gustiano 2010).

Martapura River is the tributary of Barito River flowing along the regions of Karang Intan district and Aranio district, South Kalimantan. Martapura River is utilized for various activities, such as aquaculture, one of which is Nile tilapia culture. It is run by fish farming groups using a floating fish cage system. This fish farming system is one of the efficient and effective aquaculture techniques (Yunita et al 2018).

The main problem for the fish farmers is fish disease (Rahayu et al 2013). Parasite infection is a common fish disease. The fish infection is caused by an unbalanced interaction among three components in the aquatic ecosystem, i.e. weak host, pathogen, declined environmental quality. This bad interaction makes the fish stress. As the fish

stress, they stop feeding, and their defense mechanism becomes weak, then the fish are easily infected (Cahyono et al 2006). This condition will enhance the parasite's breeding.

Increased ability of the ectoparasite breeding will raise the parasite's prevalence on the host body. It can trigger parasite propagation that will harm the host (Ramadan et al 2012). The parasites can move from one host to another and infect the whole fish population. The transmission can occur through direct contact between the healthy fish and the parasite-infected fish. In a high-density fish population, transmission can quickly occur (Ohoiulun 2002). The parasite infection can cause health problems for the fish and result in big economic losses, such as mass mortality, slow growth, and low fecundity. Parasite infection causes the consumers to reject the fish due to low fish quality (Purwanti et al 2012) and impacts human health as well (Kordi & Tancung 2005).

Disease infection can be detected from a parasite infecting the fish. Thus, ectoparasite identification, infection prevalence, and intensity need to be done to control ectoparasite infection. The occurrence of parasites can result in a deadly effect on the host population and an economic loss for the fish farmers if it is not immediately controlled (Anshary 2008). Nowadays there is still little information on ectoparasite identification, prevalence, intensity, and dominance in the Nile tilapia in South Kalimantan. The information is only available for climbing perch *Anabas testudineus* in the fish pond of Balai Perikanan Budidaya Air Tawar (BPBAT-Freshwater Culture Centre) Mandiangin with 100% prevalence and intensity of 96.25 ind $fish^{-1}$ (Sianturi 2022). This study aims to identify the ectoparasite and analyze the prevalence, intensity, and dominance of the ectoparasite in Nile tilapia cultured in Martapura River, South Kalimantan.

Material and Method

Research period and venue. This study was done for one month from January 3rd, 2022 to February 3rd, 2022. The identification of ectoparasites was conducted in the Testing Laboratory of Balai Perikanan Budidaya Air Tawar (BPBAT) Mandiangin, Banjarbaru, South Kalimantan.

Sample collection. Sample collection was carried out from 3 fish farming groups in Martapura river, South Kalimantan, considered as research stations. Station I was set in Mandi Kapau (upstream), station II in Awang Bangkal (Middle part), and station III in Tambela (downstream). The fish samples were taken with a scoop net and held in an aerated clean water-containing plastic bag.

The fish sampling was done 3 times with 10 fish from each station at each sampling activity. The total samples used in this study were 90 individuals, 30 fish from each fish farmer.

Ectoparasite identification. Fish samples were brought to the testing laboratory of BPABAT Mandiangin for ectoparasite identification. The identification work followed Kabata (1985) and Noble & Noble (1989). It used a microscopic method as follows: the fish samples had been measured before the ectoparasites were examined. Ectoparasites were examined in mucus, fins, and gill. The mucus of the body surface of the Nile tilapia sample was smeared on the object glass cleaned with alcohol and covered with a cover glass. Fins were also scratched with a cover glass and placed on the object glass and dropped with a drop of aquadest. The gill examination was done by cutting the lamella. The infected lamella is pale or brownish-colored. It is placed on the clean object glass dropped with a drop of aquadest. The parasites were observed under a microscope at 40-1000 x enlargements with 5 fields of view.

Data analyses. The type and number of parasites found were recorded, descriptively analyzed, and presented as figures and tables. Table 1 shows the intensity and prevalence of ectoparasites infecting the Nile tilapia.

Table 1

Parasite prevalence category

No	*Prevalence (100%)*	*Category*	*Remarks*
1	99-100	Always	Heavy infection
2	90-98	Nearly always	Bad infection
3	70-89	Usually	Moderate infection
4	50-69	Very often	Very often infection
5	30-49	Common	Common infection
6	10-29	Often	Frequent infection
7	1-9	Sometimes	Occasional infection
8	0.1-0.9	Rare	Rare infection
9	0.01-0.09	Very rare	Very rare infection
10	< 0.01	Almost never	Never

The prevalence estimation followed Kabata (1985):

$$\text{Prevalence (\%)} = \frac{\text{No. infected fish}}{\text{No. checked fish}} \times 100$$

Intensity rate. Intensity illustrates the abundance of a parasite in an individual or population indicated with a mean number of Nile tilapia (Table 2).

Table 2

Parasite's intensity category

No	*Intensity (ind fish^{-1})*	*Category*
1	< 1	Very low
2	1-5	Low
3	6-50	Moderate
4	51-100	High
5	> 100	Very high
6	> 1000	Overinfected

The intensity of the parasite followed the formula of Noble & Noble (1989):

$$\text{Intensity (ind fish}^{-1}) = \frac{\text{No. parasites found}}{\text{No. infected fish}}$$

Ectoparasite dominance. The dominance of ectoparasites was estimated using the formula of Noble & Noble (1989):

$$\text{Dominance (\%)} = \frac{\text{No. ectoparasite infecting the fish sample}}{\text{Total no. ectoparasites infecting the fish sample}} \times 100$$

Water quality. The water quality parameters measured during the study were temperature, pH, dissolved oxygen (DO), and ammonia. These measurements used a thermometer TP3001, pH-meter AMTAST AMT28F, DO-meter Hanna HI98193, and spectrophotometer Hanna H193733-0, respectively, and were done at each sampling activity.

Results and Discussion

Ectoparasite identification. The ectoparasite identification on Nile tilapia (*Oreochromis niloticus*) collected from the fish farming groups in Martapura River, South Kalimantan, found 4 groups of parasites, *Dactylogyrus* sp., *Trichodina* sp., *Gyrodactylus* sp., and *Epistylis* sp. (Table 3).

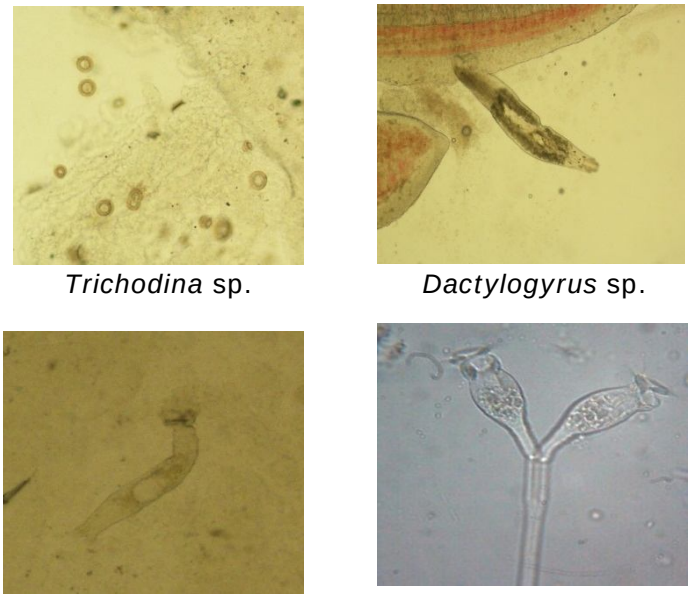
Table 3

Ectoparasite-infected organs

Infected organ	*Species*			
	Trichodina sp.	*Dactylogyrus sp.*	*Gyrodactylus sp.*	*Epistylis sp.*
Gill	+	+	+	-
Fins	+	+	+	+
Mucus	+	+	+	+

All four ectoparasites occur on the gill, fins, and mucus. The infected gill will change its color to pale and whitish. The infection is indicated by the presence of adult worms on the gill or other body parts. Skin will look reddish and pale, and there are ulcers. The ectoparasite-infected fish are not harmful for human consumption. Parasite infections are one of the inhibiting factors in fish culture. The occurrence of parasites could also impact the decline in fish weight, cultivation quality, and even rejection of human consumption due to abnormal body form (Hidayati et al 2016). Besides, it can cause massive mortality of larvae and huge economic loss if the parasite infection is not controlled (Grabda 1991; Cahyono et al 2006).

Numerous ectoparasites infect the gill of Nile tilapia because the gill is a respiratory organ that directly contacts with the surrounding environment filtering dissolved materials, food particles, and binding oxygen. Figure 1 shows the ectoparasites on the Nile tilapia collected from the farming groups in Martapura River, South Kalimantan.



Trichodina sp. *Dactylogyrus* sp.

Gyrodactylus sp. *Epistylis* sp.

Figure 1. Ectoparasites that infect Nile tilapia in Martapura River (400 x enlargement).

Trichodina sp. infects the fish by attaching to the epithelial layer with a sharp membrane tip. The parasite will then immediately circle so that the surrounding cells are damaged, it feeds on the destroyed cells, and makes serious irritation. With high parasite density and high organic concentration, this condition becomes more dangerous. It sometimes occurs without a clinical symptom. Also, the skin and fin damages could be followed by secondary infection (Anshari 2008).

Dactylogyrus sp. often infects cultured fish at a high density and with insufficient food. The disease is called dactylogyrosis with the following clinical symptoms: gill swelling, operculum protrusion, and gill discoloration. *Dactylogyrus* sp. can produce an excess mucus-like viscous liquid for the worm attachment or movement. The mucus can damage the gill disrupting the gas exchange (Lianda et al 2015).

Gyrodactylus sp. infects the external body parts, such as the body and fins. This parasite attaches to the fish's body. *Gyrodactylus* sp. reproduces by giving birth to hatchlings that are already pregnant with more hatchlings, and all hatchlings can infect the fish without an intermediate host (Awik et al 2007). According to Kabata (1985), monogenean is one of the parasites mostly infecting the external body of the fish, usually skin and gill.

Another parasite group that also infects the Nile tilapia at low density is *Epistylis* sp. It is a protozoan with stalks and branches (Kabata 1985). The stalk base attaches to the body surface. Bad water quality will enhance the growth of this parasite. *Epistylis* sp. is sessile on the substrate, such as gill and skin. It is 50-250 µm long, colonial, and presents at the branching stem, non-contractile, and multiplies through cell division. *Epistylis* sp. is a colonized ciliated protozoan that forms a thin cylinder or bell with a long and non-contractile stalk of about 0.4-0.5 mm. The clinical symptoms of *Epistylis* sp. infection are low growth, slow swimming, and the presence of damages on the infected tissues (Saglam & Sarieyyupoglu 2002; Irvansyah et al 2012; Klinger & Floyd 2013).

Ectoparasite prevalence. The infection level of ectoparasites in fish is the number of ectoparasites laboratorily identified and how severe the parasites infect the fish organ. The prevalence condition is presented in Table 4.

Table 4

Prevalence index of ectoparasites on Nile tilapia (*O. niloticus*)

Observation	*Organ*	*Prevalence index (%)*			
		Thricodina sp.	*Dactylogyrus sp.*	*Gyrodactylus sp.*	*Epistylis sp.*
Station I	Gill	46.66	80	10	-
	Fins	60	3.33	-	-
	Mucus	60	3.33	3.33	-
Station II	Gill	80	86.66	46.66	3.33
	Fins	96.66	13.33	6.66	-
	Mucus	90	30	6.66	3.33
Station III	Gill	70	53.33	10	-
	Fins	100	-	6.66	3.33
	Mucus	86.66	23.33	6.66	6.66

Table 4 demonstrates that the prevalence index in station I (Mandi Kapau fish farmers) is 46.66% for *Trichodina* sp., 80% for *Dactylogyrus* sp., and 10% for *Gyrodactylus* sp. on the gill, 60% for *Trichodina* sp. and 3.33% for *Dactylogyrus* sp. on the fins, and 60% for *Trichodina* sp., 3.33% for *Dactylogyrus* sp., and 3.33% for *Gyrodactylus* sp. in the mucus. In station II (Awang Bangkal fish farmers), it is 80% for *Trichodina* sp., 86.66% for *Dactylogyrus* sp., 46.66% for *Gyrodactylus* sp., and 3.33% for *Epistylis* sp. on the gill, 96.66% for *Trichodina* sp., 13.33% for *Dactylogyrus* sp., and 6.66% for *Gyrodactylus* sp. on the fins, whereas 90% of *Trichodina* sp., 30% of *Dactylogyrus* sp., 6.66% of *Gyrodactylus* sp., and 3.33% of *Epistylis* sp. occur in the mucus. In station III (Tambela fish farmers), it is 70% for *Trichodina* sp., 53.33% for *Dactylogyrus* sp., and 10% for *Gyrodactylus* sp. on the gill, whereas 100% for *Trichodina* sp., 6.66% for *Gyrodactylus* sp., and 3.33% for *Epistylis* sp. on the fins, and 86.66% of *Trichodina* sp., 23.33% of *Dactylogyrus* sp., 6.66% of *Gyrodactylus* sp., and 6.66% of *Epistylis* sp. occur in the mucus.

According to Williams & Bunkley-Williams (1996), the ectoparasite prevalence in station I is categorized as common infection level, station II as severe infection with an attack rate of almost always, and station III as very severe with a very frequent attack.

High parasite prevalence could result from high stocking density in fish culture. As a result, the fish population has high contact with each other and makes the ectoparasite dispersion faster. The level of infection is dependent upon the type and number of microorganisms infecting the fish, poor water quality management, fish physiology disruption, climatic fluctuation, and fish resistance as well (Mulia 2006).

The prevalence of ectoparasites with sampling sites could be affected by external factors such as environmental conditions, and internal factors. According to Maulana et al (2017), the pollution can change the water quality and increase the number of pathogens, such as ectoparasites. This condition will cause the fish stress so that an imbalanced relationship occurs among fish, the environment, and the pathogen (ectoparasite), and it will make the fish easily infected. The internal factors are water quality, stocking density, and poor nutrition (Noga 2000; Mahendra & Nurbadriat 2019).

Sinderman (1990) added that parasites can infect fish directly or indirectly. The former could occur through direct contact of healthy fish and infected fish, whereas the latter occurs if the fish immunity declines from the stress that can ease the fish to be infected.

Ectoparasite's infection intensity (no. ind^{-1}). Infection intensity is defined as an abundance of parasites on the fish individual or population and expressed as a mean number of parasites per fish. The infection intensity of ectoparasites on the Nile tilapia (*O. niloticus*) is presented in Table 5.

Table 5

Infection intensity of ectoparasites on Nile tilapia (*O. niloticus*)

Observation	*Organ*	*Infection intensity (no. ind^{-1})*			
		Thricodina sp.	*Dactylogyrus sp.*	*Gyrodactylus sp.*	*Epistylis sp.*
Station I	Gill	4.4	3.83	1.33	-
	Fins	4.56	0.33	-	-
	Mucus	5.77	0.66	0.33	-
Station II	Gill	16.07	5.92	2.1	0.66
	Fins	22.73	2.2	0.5	-
	Mucus	28.15	2.26	1.66	5
Station III	Gill	8.96	13.24	1	-
	Fins	7.5	-	0.66	1.66
	Mucus	9.23	2.04	1.33	10.83

Table 5 shows that the infection intensity of the ectoparasite in station I is 4.4 ind fish^{-1} by *Trichodina* sp., 3.83 ind fish^{-1} by *Dactylogyrus* sp., and 1.33 ind fish^{-1} by *Gyrodactylus* sp. on the gill. On the fins, it is 4.56 ind fish^{-1} by *Trichodina* sp. and 0.33 ind fish^{-1} by *Dactylogyrus* sp., whereas in the mucus, the intensity is 5.77 ind fish^{-1} infected by *Trichodina* sp., 0.66 ind fish^{-1} by *Dactylogyrus* sp., and 0.33 ind fish^{-1} by *Gyrodactylus* sp.

In station II, the gill part is infected with *Trichodina* sp. at 16.07 ind fish^{-1}, *Dactylogyrus* sp. at 5.92 ind fish^{-1}, *Gyrodactylus* sp. at 2.1 ind fish^{-1}, and *Epistylis* sp. at 0.66 ind fish^{-1}. The fins are infected with *Trichodina* sp. at 22.73 ind fish^{-1}, *Dactylogyrus* sp. at 2.2 ind fish^{-1}, and *Gyrodactylus* sp. at 0.5 ind fish^{-1}, whereas the mucus is occupied by *Trichodina* sp. at 28.15 ind fish^{-1}, *Dactylogyrus* sp. at 2.26 ind fish^{-1}, *Gyrodactylus* sp. at 1.66 ind fish^{-1}, and *Epistylis* sp. at 5 ind fish^{-1}.

In station III, the gill is infected by *Trichodina* sp. at 8.96 ind fish^{-1}, *Dactylogyrus* sp. at 13.24 ind fish^{-1}, and *Gyrodactylus* sp. at 1 ind fish^{-1}. The fins are infected by *Trichodina* sp. at 7.5 ind fish^{-1}, *Gyrodactylus* sp. at 0.66 ind fish^{-1}, and *Epistylis* sp. at 1.66 ind fish^{-1}. Mucus is infected by *Trichodina* sp. at 9.23 ind fish^{-1}, *Dactylogyrus* sp. at 2.04 ind fish^{-1}, *Gyrodactylus* sp. at 1.33 ind fish^{-1}, and *Epistylis* sp. at 10.83 ind fish^{-1}.

The highest intensity of the ectoparasite infection occurred in station II, 28.15 ind fish^{-1}, followed by station III, 13.24 ind fish^{-1}, and then station I, 5.77 ind fish^{-1}. According to Williams & Bunkley-Williams (1996) in Maulana et al (2017), the infection intensity of the ectoparasites in stations I, II, and III, at the range of 6-55 ind fish^{-1} is categorized as moderate infection level due to small sample size at the fish length range of 16-18 cm. It is in agreement with Noble & Noble (1989) that the prevalence value and the intensity rate of the ectoparasite are not always the same because it is affected by the host size; the bigger the host is, the higher the parasite infection level.

Based on the infection intensity of ectoparasite on the Nile tilapia, the highest infection was recorded in the mucus of the body surface. It could result from the mucus containing carbohydrates which become the food of the parasites (Rahmi 2012; Wirawan et al 2018). The fish infected by parasites will release much mucus in self-defense. It is in agreement with Irianto (2005) that the mucus on fish functions as one of the self protections from micro-organisms infection since it contains an antibody that is capable of protecting the fish from infections to attach to the skin. The presence of mucus also reduces the skin-water friction so that it could make the fish save energy and swim efficiently (Haryono et al 2016).

Ectoparasite dominance. The dominance level of the ectoparasite infecting the Nile tilapia (*Oreochromis niloticus*) cultured in the floating fish cage in the Martapura River is presented in Table 6.

Table 6

Ectoparasite dominance in Nile tilapia (*O. niloticus*)

No.	*Ectoparasite group*	*Dominance(%)*
1	*Trichodina* sp.	80.71
2	*Dactylogyrus* sp.	13.57
3	*Epistylis* sp.	4.58
4	*Gyrodactylus* sp.	1.13

The most dominant ectoparasite in Martapura River is *Thricodina* sp., followed by *Dactylogyrus* sp., *Epistylis* sp., and *Gyrodactylus* sp. *Thricodina* sp. is an obligatory ectoparasite that leaves the host at the adult stadium. This species can survive without a host for up to several days and can live in other hosts beyond fish (Dobberstein & Palm 2000; Asmat 2001; Basson & Van As 2002, 2006). It is in line with Jeronimo et al (2011) that *Trichodina* sp. can survive for 2 days without a host and can occur in more than one host type. Such a feature gives the parasite the chance to develop faster than other parasites that are not able to survive longer without a host. The present study found that *Trichodina* sp. had 80.71% dominance. It can infect all body organs, such as skin, mucus, gill, and fins (Ghiraldelli et al 2006). According to Durborow (2003), fish infected with this parasite in great numbers can make ulcers that could enhance a secondary infection. Kordi (2004) added also that *Trichodina* sp. can cause the presence of white spots on the head and the dorsal parts, loss of appetite, weakness, hemorrhage of the external part, the body being dull colored, and the fish often rub the body on the bottom or the pond dyke. Genus *Dactylogyrus* covers more than 900 species. This parasite group is the parasite mostly found on gills of the freshwater fish, including cyprinids. *Dactylogyrus* sp. causes serious infection of the gill filaments which will disturb respiration. *Dactylogyrus* that infects the gill in great numbers can cause mortality, because too much mucus released from gills causes gill irritation. Also, *Dactylogyrus* sp. can suck blood from the gill capillary vessels, and eventually kill the host (Wahyuni 2013; Iqbal & Haroon 2014; Juwaihir et al 2016; Chaudary et al 2017).

Water quality. Water quality parameters measured in the floating fish cage along Martapura River, South Kalimantan, are presented in Table 7.

Table 7

Water quality conditions in the study sites

Water quality parameters	*Sampling sites*		
	Station 1	*Station 2*	*Station 3*
Temperature (°C)	28.2	28.8	28.9
pH	7.2	7.6	7.7
DO (mg L^{-1})	4.8	4.5	4.9
Ammonia (ppm)	0.1	0.2	0.2

Water temperature ranges from 28.2 to 28.9°C. This range is in optimum condition for the growth of the Nile tilapia (Sucipto & Prihartono 2005), since the fish can grow well at the temperature range of 28-32ºC. Lower temperature could cause the Nile tilapia more susceptible to the ectoparasite infection.

Water pH in 3 stations ranged from 7.2 to 7.7 indicating that the water pH was appropriate for the growth and survival of the Nile tilapia. It is supported by Ghufran & Kordi (2009) that the good pH for Nile tilapia culture ranges from 6 to 8.5, but the fish can tolerate the water pH from 5 to 11. Water pH of 5-6.5 makes the fish growth inhibited (Ghufran & Kordi 2009) and the fish is very sensitive to bacterial and parasite infections. Haris & Yusanti (2018) added that low pH will inhibit fish growth and makes the fish be susceptible to bacterial infection and parasite infections.

DO is one of the parameters that are used as major option to determine the feasibility of the water for fish culture (Mantau et al 2004). The measurements indicated that DO concentration ranged from 4.5 to 4.9 mg L^{-1}. This condition could still support the growth of the Nile tilapia. In general, Nile tilapia can live in the water with DO content of 3-5 mg L^{-1}. Nevertheless, according to Diansari et al (2013), to increase fish production, the DO content should be maintained above 5 mg L^{-1}. DO concentration below 3 mg L^{-1} can inhibit the growth rate of the fish (Wijayanti et al 2019).

Ammonia measurements in the cultivation sites of Martapura River showed a range of 0.1-0.2 mg L^{-1}. These ammonia concentrations are still optimal for the Nile tilapia culture. The ammonia concentration below 0.2 mg L^{-1} is safe enough for most fishes, but higher ammonia content could be toxic to fish. Nile tilapia can still tolerate the ammonia condition below 0.3 mg L^{-1} (Djarijah 2002). The water ammonia concentration between 0.6-2.0 mg L^{-1} can be toxic to fish in a short contact period (Daelami & Deden 2001).

Conclusions. The present study found 4 ectoparasite groups infecting the Nile tilapia (*O. niloticus*) cultured in Martapura River, South Kalimantan, namely *Trichodina* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., and *Epistylis* sp. The highest prevalence of ectoparasites infecting the Nile tilapia in station I (Mandi Kapau) was 80% for *Dactylogyrus* sp. on the gill with moderate infection category under common infection rate. In station II (Awang Bangkal), the prevalence rate was 96.66% in *Trichodina* sp. on the fins with severe infection category at the broadly infection level. In station III (Tambela), the prevalence was 100% in *Trichodina* sp. on the fins with very frequent infection category at very severe infection level. The highest intensity of ectoparasite of the Nile tilapia in station I and station II was 5.77 ind $fish^{-1}$ and 28.15 ind $fish^{-1}$ for *Trichodina* sp. in the mucus. In station III, it was 13.24 ind $fish^{-1}$ for *Dactylogyrus* sp. on the gill. The infection intensity in all study sites ranged from 6 to 55 ind $fish^{-1}$ and categorized as moderate infection level. The dominant ectoparasite was *Thricodina* sp. (80.71%), followed by *Dactylogyrus* sp. (13.57%), *Epistylis* sp. (4.58%), and *Gyrodactylus* sp. (1.13%).

Conflict of interest. The authors declare that there is no conflict of interest.

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