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Research Article

Prevalence of ectoparasites on mahseer fish (*Tor tambra* Valenciennes, 1842) from aquaculture ponds and wild population of Nagan Raya District, Indonesia

[1]Zainal A. Muchlisin, [1]Abdul M. Munazir, [1]Zahrul Fuady, [2]Winaruddin Winaruddin, [3]Sugianto Sugianto, [4]Muhammad Adlim, [1]Nur Fadli, [5]Afrizal Hendri

[1] Department of Aquaculture, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh, Indonesia; [2]Faculty of Veterinary Medicine, Syiah Kuala University, Banda Aceh, Indonesia; [3] Faculty of Agriculture, Syiah Kuala University, Banda Aceh, Indonesia; [4] Department of Chemistry, Faculty of Teaching Training and Education, Syiah Kuala University, Banda Aceh, Indonesia; [5] Faculty of Marine and Fisheries, Teuku Umar University, Meulaboh, Indonesia.

Abstract. Aim: The present study aims to evaluate the prevalence of ectoparasites on mahseer fish (*Tor tambra)* from aquaculture ponds and wild population in Nagan Raya District, Aceh Province, Indonesia. Material and methods: Sixty fish from several ponds and 60 fish from Isiep River (wild population) were sampled randomly. The samples were scrutinized on macroscopic and microscopic aspects using smear methods. Results and Conclusions: It is found that 30 fish from aquaculture ponds were infected by parasites resulted 50% of prevalence but none infected-fish was from wild. The species of parasites were *Lernea* sp., *Argulus* sp. (Crustacea) and *Trichodina* sp. (Protozoa) where the *Lernea* sp. was predominant. The caudal and dorsal fins were the favorite infected target of the parasites.

Key Words: Aceh Province, Beutong, Keureling fish, aquaculture ponds, Krueng Isiep

Corresponding Author: Z. A. Muchlisin, email: muchlisinza@unsyiah.ac.id

Introduction

There are three species of mahseer or locally known as keureling fish recorded in Aceh Province, Indonesia, those are *Tor soro*, *T. tambra* and *T. tambroides* (Muchlisin & Siti-Azizah 2009) and allegedly another species that is *T. dourenensis* also found in the waters of Aceh so it is considered four species totally. These species occur in Alas River (Aceh Tenggara), Batee Iliek River (Biureun), Montala River (Aceh Besar), Meureubo River, Woyla River (Aceh Barat) and Nagan River (Muchlisin, 2011), Isiep River (Nagan Raya) and Sikundo River (Aceh Barat). According to Ingram et al (2005), mahseer is one of economically important species and the wild population of mahseer has been decreasing over the years due to over explotation, habitat pertubation and river polution.

Curently, mahseer (*T. tambra*) has been experimentally cultured in Aceh Province, however their growth was slow in captive condition due to some problems including low water quality, low artificial feed digestibility and parasitism. Initial survey conducted by Fish Quarantine Agency of Aceh Province, Indonesia in 2012 showed that the common carp (*Cyprinus carpio*) and tilapia (*Oreochromis niloticus*) in aquaculture pond system in Nagan Raya, Indonesia were positively infected by *Argulus* sp., *Dactylogyrus* sp., *Gyrodactylus* sp., and *Trichodina* sp. However, such parasites on *Acehnese mahseer* have not been reported.

Komaruddin et al (1991) suggested that the intensity of parasites infection on cultured fish depends on the hygienity of pond and the water circulation; it direct or indirectly affects the pH stability, the water temperature and the dissolved oxygen. Rukyani (1983) also stated that improperly water aeration would affect high feed-remnants and feces deposits at the bottom of pond and become suitable condition for parasite growth.

Ectoparasites are the most common parasites infested in aquatic animals reared in aquaculture ponds and aquaria (MacMillan 1991). Ectoparasites irritate the skin and often cause a reactive hyperplasia of the epithelium and led to increase the mucus production (Mehdizadeh-Mood et al 2011). This causes a secondary infection by fungus or bacteria resulting in economic losses due to growth retardation, fecundity and high morbidity (Pike 1989). Information on parasites species and their prevalence are crucial for planning a better strategy to prevent and treate the infected fishes. Presently, information on prevelence of ectoparasites on *T. tambra* was scare. Hence, the objective of the present study was to identify the ectoparasite species and their prevelence on this species from aquaculture ponds and wild population in Nagan Raya, Indonesia.

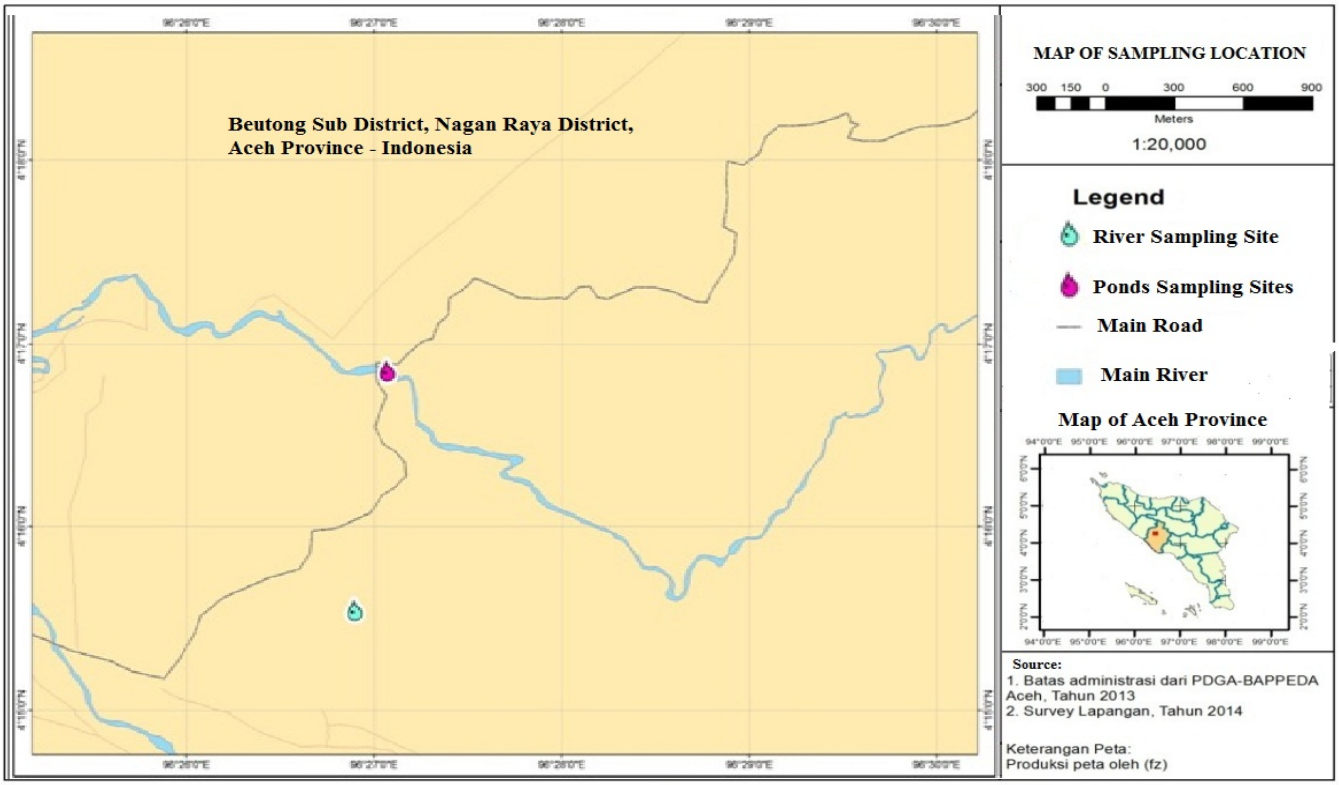

Figure 1. The map of Beutong Sub District showing sampling locations. The blue and red circles are sampling location. Pond is sampling location for captive system (aquaculture ponds) and River is sampling location for wild population (Isiep River)

Materials and methods

Study sites and sampling

The study was conducted in rainy season on December 2013 to February 2014 in Nagan Raya District, Aceh Province, Indonesia (Figure 1). The fish samples were collected from two locations i.e. local aquaculture ponds at Meunasah Krueng Village, Beutong Sub District, Nagan Raya. This sample was used as representative of captive population ($4^0$14'50.53''N, $96^0$26'13.48''E). The wild population representatives were taken from Isiep River, Nagan Raya ($04^0$16'51.61''N, $96^0$26'58.53''E).

A total of 60 fishes were sampled randomly from Isiep River using casting nets, while 60 fish samples were taken randomly from aquaculture ponds using hand nets. The fish samples were examined for ectoparasites infection using smear method (microscopic) and macroscopic (eye naked observation).

Examination procedure and prevalence analysis

The fish samples were measured for total length (mm) and weighed for total body weight (g) then anesthetized overdosed using MS222. The fish samples were observed eye naked for ectoparasites infection on the body (external examination) then the mucus from lateral body, dorsal fin, anal fin, caudal fin, ventral fins, pectoral fins, operculum and gills were taken using sterile scalpel. The mucus samples were dried under ultraviolet light for 5 minutes then one drop of Safranin was added into the dried mucus and observed under light microscope (40x magnifications). The prevalence was calculated using proposed formula by Kabata (1985) as follow:

Prevalence (%) = (∑ infected fish / ∑ examined fish)x100%

While the intensity was calculated using the formula as follow:

Intensity = ∑ parasites found / ∑ infected fish

Results

A total of 30 fish samples from aquaculture pond system were positively infected by ectoprasites resulted in 50% of prevalence. There were no fish from wild population infected by ectoparasites (0% of prevalence) (Table 1). Further identification showed that the ectoparasites were belonging to Protozoa (*Trichodina* sp.), Crustacea (*Lernea* sp. and *Argulus* sp.). Based on length classes, it showed that the prevalence and intensity of parasites infection increased as increasing of the length class of fish samples and the higher prevalence was found at 349-510 (mm) and 511-680 (mm) length classes (Table 2).

Table1. Ectoparasites infection on mahseer (*T. tambra*) from aquaculture pond system and wild population

No.	Length classes (mm)	Aquaculture pond (Captive system)	Isiep River (wild population)
1	25 - 186	-	-
2	187 - 348	+	n/a
3	349 - 510	+	n/a
4	511 - 680	+	n/a

Note: Negative infection (-), positive infection (+), and no fish was available (n/a).

Table 2. Prevalence and intensity of parasites on mahseer (T. tambra) from aquaculture pond according to length classes of fish sample

No.	Length classes (mm)	∑ Infected fish	∑ Examined fish	∑ Parasite	Intensity	Prevalence (%)
1	25 - 186	0	15	0	0	0
2	187 - 348	17	32	35	2	53%
3	349 - 510	2	2	13	6,5	100%
4	511 - 680	11	11	367	33	100%
	Total	30	60	415	13,8	50%

Table 3. Prevalence and intensity of ectoparasites on mahseer (*T. tambra*) from aquaculture pond based on infected organs

No.	Infected organs	Ectoparasites			Total parasites	Total infected fish	Intensity	Prevalence (%)
		Trichodina sp.	*Argulus* sp.	*Lernea* sp.				
1	Operculum	-	4	46	50	8	6.2	26
2	Gills	2	-	-	2	2	1	6
3	Lateral body (two sides)	-	13	32	45	10	4.5	33
4	Pectoral fins	-	2	53	55	9	6.1	30
5	Dorsal fin	-	6	55	60	20	3	66
6	Caudal fin	-	19	103	122	23	5.3	76
7	Anal fin	-	6	38	44	8	5.5	26
8	Ventral fins	-	-	13	13	6	2.1	20
9	Mouth cavity	-	-	16	16	3	5.3	10
10	Lips	-	-	5	5	3	1.6	10
11	Noise lobe	-	-	3	3	2	1.5	6
	Total	2	50	363	415			

The study revealed that all examined-organs were infected by ectoparasites with the prevalence values ranged from 6% to 76% and the intensity ranged from 1.0 to 6.2. The higher prevalence was found at caudal fin followed by dorsal fin, but the higher intensity was found at operculum (Table 3).

Discussion

The study revealed that the ectoparasites only infect fishes when the fish's size already >186 mm. Fish sample taken from wild were smaller size, therefore their infection was not obvious. We presumed that probably fish from wild populations might also be infected by ectoparasites, but not detected in this study. We suspect that pathogens carried away by the water and get into the pond. The water is supplied from irrigation channel and pass through rice fields and then many freshwater snails and heron birds become intermediate agent for parasites in paddy field areas. According to Afrianto and Liviawati (1992) that the golden apple snails, freshwater snails and hens were a potential vector for fish parasites.

Length classes showed that the prevalence and the intensity of parasites infection increased as increasing of the length class of fish samples. The higher prevalence was found at 349-510 (mm) and 511-680 (mm) of length classes (Table 2). This finding is in agreement with Kennedy (1975) and Alifuddin et al (2002; 2003) who stated that increasing the size or age of the fish will make longer in contact with the parasites and therefore the probability of attacking fish by parasites also increases. The high prevalence and intensity might have correlation with the attachment area on the fish body, where the bigger fish provides more space for parasites to cling (Untergasser, 1989).

It indicates that caudal and dorsal fins are the organ most frequently infected by ectoparasites. Among the three species of parasites, two species i.e. *Argulus* sp. and *Lernea* sp. infected those organs while the *Trichodina* sp. only infects on the gills and not found in other organs of *T. tambra*. However, Winaruddin and Eliawati (2007) found that *Trichodina* sp. did not only infect gills, but also attacked fins, scales and operculum of common carp (*C. carpio*) reared in floating net cages at Lake Laut Tawar, Indonesia. The *Trichodina* sp. was also a common external parasite in rainbow trout (*Oncorhynchus mykiss*, Walbaum, 1792) farm in Mazandaran Province, Iran (Mehdizadeh-Mood et al 2011). According to Kabata (1985) that common carp, tilapia and catfish (*Clarias gariepinus*) are among the common freshwater fish were often infected by ectoparasites. Infections of parasites on the caudal and dorsal fins were higher in this study probably due to these organs easily to infest and there are many blood vessels that supply nutrients for ectoparasites. This speculation was supported by Rohde (1982) who stated that parasites prefer to inhabit the organs of fish if the organ is

easier to be occupied and it provides space and food for growing and breeding.

The *Lernea* sp. is the most dominant parasites in number and it infects all organs as observed in this study. This because the parasite had an effective way to infest on the host. Their anterior sucker embed into host body to absorb nutrient. Their posterior part, which is outside the body of the host, has an egg sac that allows them to reproduce optimally (Alifuddin et al 2003). The *Lernea* sp. was also a predominant parasite for *T. tambroides* in upstream of Barito River, Kalimantan, Indonesia (Haryono, 2006). Beside *Lernea* sp., the infection of *Argulus* sp. is also a serious problem in freshwater aquaculture ponds as recorded in this study. According to Mousavi et al (2011), *Argulus* are common parasites of fresh water fish and the argulids frequently attach to their hosts and cause the tissue damages and stress in infested fish, and also they potentially act as vectors and spread pathogens among fish (Cusack & Cone 1986).

Conclusions

The fish sample from aquaculture pond was positively infested by ectoparasite at 50% of prevalence with 13.8 of intensity in average and ectoparasite-infection was not obvious for fish from wild population, this might be the wild-fish size has not big enough for infection target. There are three species of ectoparasites were identified namely *Lernea* sp. and *Argulus* sp. (Crustacea) and *Trichodina* sp. (Protozoa) where the *Lernea* sp. was a predominant compared to other parasites. The prevalence and intensity increased with increasing in fish size and all of examined organs were infested by parasites. The higher prevalence and intensity were found at caudal and dorsal fins.

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References

Afrianto E, Liviawaty E. Introduction to pest and diseases of fish. Kanisius,Yogyakarta. 1992 (In Indonesian).

Alifuddin M, Priyono A, Nurfatimah A. Inventory of parasites on ornamental fishes passed through Soekarno Hatta Airport, Cengkareng, Jakarta. Jurnal Akuakultur Indonesia 2002;1(3):123–127 (In Indonesian).

Alifuddin M, Hadiroseyani Y, Ohoiulun I. Freshwater aquarium fish parasites (swordtail, goby and rainbow). Jurnal Akuakultur Indonesia 2003;2(2):93-100 (In Indonesian).

Cusack R, Cone DK. A review of parasites as vectors of viral and bacterial diseases of fish. J Fish Dis 1986;9:169-171.

Haryono. Biological aspect of tambra fish (*Tor tambroides Blkr*) the exotic and rare species as a basic for domestication. Biodiversitas 2006; 7(2): 195-198 (In Indonesian).

Ingram B, Stephen S, David T, Sih-yang S, Silva D, Sena S. Induced spawning, larval development and rearing of two indigenous Malaysian mahseer, *Tor tambroides* and *T. douronensis* broodfish in captivity. Aquaculture Research 2005;36(10):983-995.

Kabata Z. Parasites and diseases of fish cultured in the tropics. Tailor & Francis, London, UK. 1985.

Kennedy CR. Ecological animal parasitology. Blackwell Scientific Publications, Oxford. 1975.

Komaruddin O, Praseno O, Anwar ZI. Parasite infection on commo carp larvae reared in the aerated pond system. Bulletin Penelitian Perikanan Darat 1991;(2):133-136 (In Indonesian).

MacMillan JR. 1991 Biological factors impinging upon control of external protozoan fish parasites. Ann Rev Fish Dis 1991; 1:119-131.

Mehdizadeh-Mood S, Shohreh P, Sahandi J. A survey on ectoparasite fauna of cold water fish farms in Mazandaran Province, Iran. HVM Bioflux 2011;3(3):246-251.

Mousavi HE, Behtash F, Rostami-Bashman M, Mirzargar SS, Shayan P, Rahmati-holasoo H. Study of *Argulus* spp. infestation rate in Goldfish, Carassius auratus (Linnaeus, 1758) in Iran. HVM Bioflux 2011;3(3):198-204.

Muchlisin ZA, Siti Azizah MN. Diversity and distribution of freshwater fishes in Aceh waters, Northern Sumatera, Indonesia. International Journal of Zoological Research 2009;5(2):62-79.

Muchlisin ZA. Diversity of freshwater fishes with emphasis on some biological aspect of depik (*Rasbora tawarensis*) the endemic species in Lake Laut Tawar, Indonesia. Thesis, Universiti Sains Malaysia, Penang. 2011.

Pike AW. Sea lice-major pathogens of farmed Atlantic salmon. Parasite Today 1989;5:291-297.

Rohde K. Ecology of marine parasites. University of Queensland Press, New York. 1982.

Rukyani A. Identification of parasites on African catfish (*Clarias gariepinus*) larvae. Bulletin Penelitian Perikanan Darat, 1983;(4):125-127 (In Indonesian).

Untergasser D. Handbook of fish disease. TFH Publication, Hongkong. 1989.

Winaruddin, Eliawardani. Inventory of extoparasites on common carp in the floating cages net system at Lake Laut Tawar, Aceh tengah District. Jurnal Kedokteran Hewan 2007;1(2): 66-69 (In Indonesian).

Authors

•Zainal Abidin Muchlisin, Department of Aquaculture, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh 23111, Indonesia. e-mail: muchlisinza@unsyiah.ac.id

•Abdul Majid Munazir, Department of Aquaculture, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh 23111, Indonesia, e-mail: munazir_abdulmajid@yahoo.com

•Zahrul Fuady, Department of Aquaculture, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh 23111, Indonesia, e-mail: z.foeadie@gmail.com

•Winaruddin Winaruddin, Faculty of Veterinary Medicine, Syiah Kuala University, Banda Aceh 23111, Indonesia,

•Sugianto Sugianto, Faculty of Agriculture, Syiah Kuala University, Banda Aceh 23111, Indonesia, e-mail: s.sugianto@gmail.com

•Muhammad Adlim, Department of Chemistry, Faculty of Teaching Training and Education, Syiah Kuala University, Banda Aceh 23111, Indonesia. e-mail: adlimbandang@yahoo.com

•Nur Fadli, Department of Aquaculture, Faculty of Marine and Fisheries, Syiah Kuala University, Banda Aceh 23111, Indonesia. e-mail: ivad29@yahoo.com

•Afrizal Hendri, Faculty of Marine and Fisheries, Teuku Umar University, Meulaboh, Indonesia, e-mail: hendri2020@gmail.com

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