Prevalence and Intensity of Ectoparasites on Cultivated Catfish (Clarias sp.) in Aquaculture Ponds and Bioflocs System in Aceh Besar, Indonesia.

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Abstract. The purpose of this research is to determine the intensity and the prevalence of ectoparasites found in catfish biofloc aquaculture ponds and traditional catfish in Aceh Besar. The research was conducted at the Fish Quarantine Agency for Quality Control and Safety of Fishery Products (BPKIPM) Blang Bintang. This research used a descriptive method while the catfish samples were taken using a random sampling method. The sample of catfish is 100 samples which are divided into 50 catfish with biofloc system and 50 catfish using the traditional system. The organs observed in catfish are fins (back, chest, tail, anal, stomach), gills, and mucus. The results of this study indicate that there were 3 types of ectoparasites have been identified, Vorticella sp., Trichodina sp., and Dactylogyrus sp. The highest prevalence rate is infection parasite by Dactylogyrus sp. in Leubok village, Aceh Besar which use a traditional system, and it is categorized as “always” or “very severe infection” (100%) while for the biofloc system in the village of Reukih Dayah, Indrapuri, Aceh Besar it is categorized as “moderate or “moderate infection” (88%). For the lowest prevalence rate in ectoparasites is Vorticella sp. It is found in biofloc ponds and categorized as “rare” infections about (2%). The highest level of parasite intensity is infection with Dactylogyrus sp. Both media are categorized as "medium". The differences in the intensity value of the two media are biofloc media has an intensity of 22.7 meanwhile the traditional has 11.3.

1. Introduction
Catfish is one of the freshwater fish commodities that have great demand in market, not only as a consumed fish but also it is widely grown by the Indonesian people because of large consumer demand that makes fish farmers need to produce regularly to fulfill its demands. The biofloc technique has advantages compared to traditional cultivation way, including; it can reduce inorganic nitrogen waste from feed residues and manure, this technique also provides additional protein feed for farmed animals to increase growth and feed efficiency.

Bioflok technique is conducted by adding carbohydrates organic on fish rearing media to increase the C/N ratio and stimulate the growth of heterotrophic bacteria that can assimilate inorganic nitrogen into bacterial biomass [1]. Parasitic infection is one of the pathogens that generally attack catfish. One
type of fish disease is a parasite [3]. Parasites are the most common fish disease. Parasites are organisms that live on the bodies of other organisms and generally hurt their hosts [6].

At present, the research on freshwater fish about catfish ectoparasites has been limited to Aceh Besar. Umara et al. the identification of parasites on snakehead fish in the Meunasah Manyang Lamlhom village, Lhoknga Aceh Besar found two types of parasites that infect the snakehead fish there is Pallisentis sp. and Trichodina sp [11]. Meanwhile, a research conducted by Wildani et al. about the identification of ectoparasites on catfish in fish farming ponds in Lampeuneurut village, Aceh Besar district said that there are five types of ectoparasites that infect the catfish, such as Gyrodactylus sp., Dactylogyrus sp., Chilodonella sp., Trichodina sp. and Ichtyophthirius multifiles [12].

A similar Parasite type was found by Maulana et al., the intensity and prevalence of ectoparasites in betok fish from general waters of the northern Aceh mainland found 3 ectoparasite species that infect betok fish, they are Dactylogyrus sp., Trichodina sp., and Argulus sp [8]. To control the population of a parasite in fish, it can be done by identifying the parasite by calculating the prevalence and the degree of its infection. Prevalence is the percentage of fish infected by parasites or the proportion in all organisms suffered by fish and at a specific time it is regardless of when they were infected [7].

The infected fish are caused by the interactions among the host (host), disease-causing bodies (pathogens), and the environment (environment) [3]. This incompatible interaction causes stress in fish so that the seven self-defence mechanisms become weak. Thus the disease is easy to come into the body and cause disease [2]. Each type of parasite has a different habitat in the host organ as a place for living, but some ectoparasites infect two or more organs of the host's body, such as Trichodina sp., which can infect scales, skin, fins, and gills.

2. Materials and Methods

2.1 Tools and materials

Tools and materials used in this research are microscopes, stereoform. Slide glass, cover glass, scales, caliper, tray, petri dish, dissecting set, identification book, thermometer, hand refractometer, pH meter, camera, catfish, and aquades. This study used a descriptive method, while the catfish sampling was conducted directly in the Indrapuri biofloc catfish farming area and traditional catfish farming in Leubok catfish village, Blang Bintang, Aceh Besar using a random sampling method.

2.2 Methods

2.2.1 Sampling.

The catfish (Clarias sp.) sampling was carried out randomly (random sampling) at two different stations with 50 samples of fish in each station. The fish samples that have been taken then are put into a stereoform box which will be taken and then identified for the parasites at the Fish Quarantine Agency for Quality Control and Fishery Product Safety (BKIPM), Blang Bintang, Aceh Besar, Aceh, Indonesia.

2.2.2 Ectoparasite Analysis and Water Quality

Analysis of ectoparasites was carried out using a microscope, based on the instructions of Nuku Kabata [6]. Water quality measurements in this study are temperature, pH, and salinity by taking water samples and checking at the Laboratory of the Faculty of Marine Affairs and Fisheries, Syiah Kula University, Darussalam, Banda Aceh, Aceh, Indonesia.

2.3 Data analysis

The found parasite type was recorded such as amount and organ where the parasite was found, then the prevalence and intensity values were calculated using the formula [6]. Then analyzed descriptively.

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\text{Prevalence (\%)} = \frac{\text{\# ectoparasite infected fish}}{\text{\# examined fish}}
\]
3. Results and Discussion
The observations of ectoparasites were conducted in catfish farming ponds with biofloc systems and traditional catfish systems in the Aceh Besar area, using a light microscope, 100 catfish samples which are separated into 50 catfish in biofloc system in Indrapuri and the rest 50 catfish in traditional system in Indrapuri, Leubok Aceh Besar. Three types of ectoparasites have been identified, there are Vorticella sp., *Trichodina* sp., and *Dactylogyrus* sp. This is in line with the Hadiroseyani et al statement that there are several types of ectoparasites that attack catfish, from protozoa called *Trichodina* sp., *Ichthyophthirius multifilis* sp., *Gyrodactylus* sp., *Vorticella* sp., *Chilodonella* sp. as for the monogenean worms, called *Gyrodactylus* sp., and *Dactylogyrus* sp [4].

![Figure 1](image_url) Types of ectoparasites found. (a) *Trichodina* sp., (b) *Dactylogyrus* sp., (c) *Vorticella* sp.
The observed organ during the study were pectoral fins, tail fins, pelvic fins, dorsal fins, anal fins, mucus, and gills. Table 4.1 shows that the level of prevalence and intensity of parasites that attack varies from place to place and system. The prevalence rate of ectoparasites in traditional catfish ponds in Leubok Blang Bintang is higher than the prevalence rate of ectoparasites in biofloc catfish ponds in Indrapuri, Aceh Besar. This is presumably because it is influenced by traditional ponds that have no biosecurity system. Adequate and water quality management systems. In traditional catfish ponds, it is proven by a large number of dead or sick catfish carcasses.

**Table 3.** Types of ectoparasites, prevalence and intensity of parasites found in 100 samples of catfish (Clarias sp.) during the study.

| Media   | Ektoparasite | Infected (fish) | Parasite (ind) | Prevalence (%) | Intensity (Ind/Fish) |
|---------|--------------|-----------------|----------------|----------------|----------------------|
| Traditional | Trichodina sp. | 15              | 26             | 30             | 1.7                  |
|          | Dactylogyrus sp. | 50              | 1,139          | 100            | 22.7                 |
| Bioflok | Vorticella sp. | 1               | 1              | 2              | 1                    |
|          | Dactylogyrus sp. | 44              | 501            | 88             | 11.3                 |

The provision of natural food such as runcah fish, snails, and poultry, as well as the water quality itself, are less than optimal. Cahyono et al also stated that the transmission of parasitic diseases occurs through several mechanisms, including direct contact among sick fish and healthy fish, carcasses of sick fish, and water [1]. In table 3, it can be seen that the worms from the class Trematoda Monogenea, namely Dactylogyrus sp., more dominantly infecting catfish than other ectoparasites found. The development from this worm itself occurs directly where the eggs are large and brown, and they are equipped with a long strap. The number of catfish (Clarias sp.) infected by the Dactylogyrus sp. is 50 with 1,139 ectoparasites with a prevalence of 100% and categorized as "always" category and the intensity of 22.7 categorized as "moderate" category in Leubok traditional ponds. Then 44 with 501 ectoparasites with a prevalence of 88% categorized as "usually" category and intensity of 11.3 into the "moderate" category in biofloc aquaculture ponds Dactylogyrus sp. attack on several organs but more attacks on the gills, because the gills are a predilection for these ectoparasites.

**Table 4.** Prevalence and intensity in the catfish organs (Clarias sp.)

| Organ   | Infected (fish) | Parasite (ind) | Prevalence (%) | Intensity |
|---------|-----------------|----------------|----------------|-----------|
| Pectoral fin | 38             | 95             | 38             | 2.5       |
| Eco Fin | 7               | 19             | 7              | 2.7       |
| Anal fin | 4               | 17             | 4              | 4.2       |
| Pelvic fin | 34             | 95             | 34             | 2.7       |
| dorsal fin | 16             | 49             | 16             | 3         |
| Mucus   | 47              | 137            | 47             | 2.9       |
| Gill    | 94              | 1,243          | 94             | 13.2      |

This is in line with the statement of Kabata that Dactylogyrus sp. is a type of monogenean trematode worm which prides itself on the gills [6]. From 50 traditional pond catfish observed in Leubok village, Blang Bintang, Aceh Besar, 15 fish were infected with the protozoan ectoparasite, Trichodina sp. Meanwhile, the biofloc pond system in Reukih Dayah village, Indrapuri, Aceh Besar, did not show infected catfish by Trichodina. sp. It is due to water sources and water quality in Leubok village which are less controlled because water quality such as temperature has an important role in the development of the parasite Trichodina sp. Riko et al. stated that the development of ectoparasites in waters is influenced by environmental factors such as temperature and the chemicals dissolved content in waters [10]. Then the high density of catfish can also affect the emergence of the
parasite *Trichodina* sp. Beside infecting the freshwater fish, some parasites was known to infect the marine organism. Other research investigated the ectoparasite infections on mangrove crab and blood cockle in Banda Aceh city and Aceh Besar district. The *Perkinsus* sp and *Spiroxys* sp were known infected the blood cockle (*Anadara granosa*) [13] while *Zoothamnium* sp, *Vorticella* sp., and *Epistylis* sp. *Octolasmis* sp., and *Copepoda* sp. Were known infected the mangrove crab (*Sylla serata*) [14].

### Table 5. Water Quality Measurement

| Media     | Parameter | Unit | Measurement results |
|-----------|-----------|------|---------------------|
| Bioflok   | pH        | -    | 6.8                 |
|           | Temperature | C   | 28                  |
| Traditional | pH     | -    | 6.2                 |
|           | Temperature | C   | 29                  |

Mulia states that a high level of density effects to the spread of *Trichodina* sp. become faster than *Vorticella* sp as shown in Table 4 that was only infected in one biofloc catfish with prevalence in the “rare” category, which means the infection is very rare [9]. Therefore, it is categorized as "low" category. Based on Table 4, the organs most frequently attacked by parasites are the gills with a moderate intensity category and the prevalence categorized as “almost always” or “severe infection”, because these organs are organs that are often flowed by blood. This is in line with Irvansyah *et al.* research that the gills are one of the organs that are often flowed on blood, there are blood vessels and a protective layer in the form of a thin layer of epithelial tissue so that they are easily attacked by ectoparasites [5].

### 4. Conclusion

#### 4.1 Conclusion

Three types of ectoparasites that exist in traditional and biofloc systems are *Trichodina* sp., *Dactylogyrus* sp., and *Vorticella* sp. The highest prevalence rate was the infection with the parasite *Dactylogyrus* sp. in Leubok village, Aceh Besar, which applies the traditional system, which is categorized as “always” or “very severe infection” (100%) while the biofloc system in Reukih Dayah village, Indrapuri, Aceh Besar is in the “moderate” or “moderate” category, moderate infection” (88%). The lowest prevalence rate is in the ectoparasite *Vorticella* sp. That found in biofloc ponds and it is categorized as “rare” infections (2%). The highest level of parasite intensity was infection by *Dactylogyrus* sp. on the two media and both are categorized as "medium" category, the difference intensity value of two media are biofloc media has an intensity of 22.7 and traditional 11.3.

#### 4.2 Suggestion

The further research is needed to compare the prevalence and the intensity of ectoparasites in traditional catfish aquaculture and biofloc. Water quality checks are carried out once a week in traditional ponds so that water quality is controlled and improves biosecurity so that parasitic infections are reduced.

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