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Inventory Of Ectoparasites On Common Carp (*Cyprinus carpio L.*) In Ngrajek Village, Mungkid District, Magelang Regency

Inventarisasi Ektoparasit Ikan Mas (*Cyprinus carpio L.*) Di Desa Ngrajek, Kecamatan Mungkid, Kabupaten Magelang

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Abstract

Carp is a type of freshwater fish that has high economic value and is widely cultivated because it grows quickly and is easy to spawn. Often there are obstacles in carrying out cultivation activities, one of which is caused by ectoparasites. This research aims to determine the types of ectoparasites and to determine the level of prevalence and intensity of ectoparasites found in goldfish fry in Pokdakan Mina Abadi Sejahtera, Ngrajek Village, Mungkid District, Magelang Regency. The research was conducted from December 2022- January 2023. Fish samples were taken for 3 weeks with a total of 20 fish/pond in 1 week. Every time a sample was taken, abiotic factors were measured, namely temperature, pH, DO and ammonia. Ectoparasite examination was carried out at the Tidar University Laboratory and LPKIL Muntilan using the mucus scraping method on the surface of the body and biopsy, namely taking a small portion of the fin and gill organ tissue. The results of the research found ectoparasites from the Protozoa phylum, namely Trichodina sp. and Ichthyopthyrius multifiliis, the Vermes phylum, namely Dactylogyrus sp., and the Arthropoda phylum, namely Argulus sp. The highest prevalence value was obtained by Trichodina sp. in pool 2 it was 100% with the always infection category. The highest intensity value was Trichodina sp. in pond 1 there were 38/head in the moderate infection category. The average water quality in pond 1 for goldfish fry is 28.29 ºC, pH 7.25, dissolved oxygen 6.88 mg/L and ammonia 0.24 mg/L. The average water quality in the pool of 2 goldfish fry was 29.92 ºC, pH 7.38, dissolved oxygen 6.88 mg/L and ammonia 0.24 mg/L. *Keywords*: *Feed, Feed Efficiency, Lysine, Bileh Fish*.

Keywords : *Ectoparasites, Carp, Intensity, Prevalence, Fish disease*

Abstrak

Ikan mas merupakan salah satu jenis ikan air tawar yang mempunyai nilai ekonomis tinggi dan banyak dibudidayakan karena memiliki pertumbuhan yang cepat dan mudah dipijahkan. Seringkali ada kendala dalam melakukan kegiatan budidaya salah satunya disebabkan oleh ektoparasit. Penelitian ni bertujuan untuk mengetahui jenis-jenis ektoparasit serta untuk mengetahui tingkatan prevalensi dan intensitas dari ektoparasit yang ditemukan pada benih ikan mas di Pokdakan Mina Abadi Sejahtera Desa Ngrajek, Kecamatan Mungkid, Kabupaten Magelang. Penelitian dilakukan dari bulan desember 2022-januari 2023. Sampel ikan diambil selama 3 minggu dengan jumlah 20 ekor/kolam dalam 1 minggu. Setiap pengambilan sampel dilakukan pengukuran faktor abiotik yaitu Suhu, pH, DO, dan Amoniak. Pemeriksaan ektoparasit dilakukan di Laboratorium Universitas Tidar dan LPKIL Muntilan menggunakan metode scraping lendir pada bagian permukaan tubuh dan biopsi yaitu mengambil sebagian kecil dari jaringan organ sirip dan insang. Hasil penelitian ditemukan ektoparasit dari filum Protozoa yaitu Trichodina sp. dan Ichthyopthyrius multifiliis, filum Vermes yaitu Dactylogyrus sp., serta filum Arthropoda yaitu Argulus sp. Nilai prevalensi tertinggi diperoleh Trichodina sp. pada kolam 2 sebesar 100% dengan kategori infeksi selalu. Nilai intensitas tertinggi yaitu Trichodina sp. pada kolam 1 sebanyak 38/ekor dengan kategori infeksi sedang. Rata-rata kualitas air kolam 1 pada benih ikan mas yaitu 28,29 ºC, pH 7,25, oksigen terlarut 6,88 mg/L dan amoniak 0,24 mg/L. Rata-rata kualitas air kolam 2 benih ikan mas yaitu 29,92 ºC, pH 7,38, oksigen terlarut 6,88 mg/L dan amoniak 0,24 mg/L.

Kata kunci : *Ektoparasit, Ikan mas, Intensitas, Prevalensi, Penyakit ikan*

1. Introduction

Indonesia is a country that has a larger water area than its land. The fisheries sector is one of the most promising factors for economic development in Indonesia. Aquaculture is one of the sectors that is expected to realize the welfare mission of the marine and fisheries community where Indonesia is in second

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place with a contribution of 5.77% of world aquaculture fish production (FAO, 2016).

Mungkid Sub-district is one of the sub-districts in Magelang District whose fisheries sector is relatively advanced, where Mungkid Sub-district has an area of 425 hectares of aquaculture land in 2020 divided into 33 hectares in ponds and 393 hectares in rice fields (BPS, 2019). The number of commodities in Pokdakan Mina Abadi Sejahtera includes gourami, tilapia, and goldfish.

Carp (Cyprinus carpio L.) is a commodity that is prioritized in Pokdakan Mina Abadi Sejahtera, Carp farming is growing rapidly with increasing demand for fish. Delicious meat flavor, easy to digest and high nutrition make carp very popular with the Indonesian people (Afifah *et al*., 2014). Based on data from BPS (2019), from 2018-2020 carp production has increased in Mungkid District from 28,572.37 thousand heads to 77,621 heads with total production in Magelang District reaching 572,242 heads in 2020.

Freshwater fish farming often faces obstacles. One of them is the presence of diseases that attack fish, both infectious and non-infectious diseases. These problems are also often faced by fish farmers from Pokdakan Mina Abadi Sejahtera, Ngrajek Village, Mungkid District, Magelang Regency. There are various organisms that cause disease, one of which is ectoparasites (Bhakti *et al*., 2011). The presence of diseases caused by parasites is sometimes unknown by fish farmers, causing a decrease in production which results in losses for fish farmers (Adiwimarta, 2011).

Farmers in Pokdakan Mina Abadi Sejahtera utilize the water source from Tuk Mudal for cultivation activities. Water from the Tuk Mudal is channeled into the aquaculture ponds through irrigation channels. The opportunity for parasites to enter and spread in the cultivation site is quite large due to the poor water flow system. Water flow from irrigation canals can carry parasites that can attack cultured fish when water enters because in Pokdakan Mina Abadi Sejahtera does not apply biosecurity so that water directly enters the pond without any good treatment.

2. Materials and Methods

2.1 *Place*

Fish samples were obtained from ponds in Pokdakan Mina Abadi Sejahtera in Ngrajek Village, Magelang Regency. Observations of ectoparasites were carried out in the laboratories of the Faculty of Agriculture, Tidar University and LPKIL Muntilan, while observations of ammonia water quality were carried out at the South Kramat Health Environmental Chemistry Laboratory, North Magelang, Magelang City.

2.2 Tools and Materials

The tools used in this research are seser, plastic, sample bottles, light microscope, optilab, tray, dissecting set, drop pipette, cover glass, object glass, do meter, pH meter, thermometer, ruler, analytical scales, petri dish, and stationery. While the materials used are goldfish, distilled water, NaCl physiological solution, ammonia test-kit, tissue, and label paper.

2.3 Research Procedure

Samples of 60 carp in two ponds (30 fish/pond) were taken using random sampling method. Observation of ectoparasites begins with visual observation of the external morphology or the surface of the fish body. The organs to be studied are the skin, fins, and gills. Parasite observation procedures according to Adamimawar *et al*. (2019) is as follows:

1. Fish samples obtained were put into plastic containers and then brought to the research site.
2. The initial examination of fish samples is by observing the physical signs of the outside of the fish body including body surface, skin observation, gills, fins, and operculum to determine the presence of ectoparasites in fish.
3. Examination of the skin using the scraping method, namely by making a smear of mucus from the surface of the fish body, then placing the mucus on the object glass, examination of the fish fins is done by taking or cutting the fins of the fish, then placed on the object glass, observation of the gills, both sides of the gills are taken, then separated between the filaments with the tapis, then placed on the object glass, all samples are closed using cover glass and then observed using a microscope. Parasite observations were made using a microscope with a magnification of 100-400x.
4. The next stage is the identification of ectoparasites found in fish samples using the ectoparasite identification book "Common Freshwater Parasite Pictorial Guide" by Deborah B. Pouder, Eric W. Cutis, and Roy P.E. (2011) and the book "Fish Parasitology (Biology, Identification and Control)" by Hilal Anshary (2016).
5. Water Quality Measurements Measurements of temperature, pH, and DO were carried out in the morning at 08.00 WIB in situ, while measurements of ammonia levels were carried out ex situ and then tested in the laboratory.

2.4 Data Analysis

The main parameters in this study were the prevalence and intensity of carp ectoparasites in the Mina Abadi Sejahtera fish farmer group, while the supporting parameters were water quality including temperature, pH, DO, and ammonia. The level of ectoparasite attack can be calculated using the following calculation:

$$Prevalensi\ (\%) = \frac{Jumlah\ ikan\ terinfeksi}{Jumlah\ ikan\ diperiksa}\ x\ 100\%$$

$$Intensitas\ (ind/ekor) = \frac{JEM}{JET}\ x\ 100\%$$

Description:
JEM = Number of infecting A ectoparasites
Ln Bt = Number of fish infected with ectoparasites A

3. Results and Discussion

3.1 *Ectoparasite Profile in Goldfish (C. carpio)*

Based on the results of the examination of 60 fish samples, the total ectoparasites found were as follows:

a) *Trichodina* sp.

Trichodina sp. is a type of ectoparasite that belongs to the order Petrichida and the family Trichodinidae and genus *Trichodina*. *Trichodina* parasites found in carp examination have a round disk-like shape equipped with cilia surrounding the outside and have a disk. The description of the morphological characteristics of *Trichodina* is in accordance with the research of Syarifah (2022) which states that *Trichodina* sp. is round, its body is surrounded by cilia and has dentitel as an adhesive tool or to stick.

Figure 1. *Trichodina* sp.

Trichodina found during the study is actively moving by doing circular movements, *Trichodina* itself has a denticle ring in the form of a disc with a sharp membrane tip that is used when infecting the host to attach to the host's body, after attaching *Trichodina* will spin around using cilia 360º so that it will damage and eat epithelial cells then penetrate blood vessels and cause irritation or injury to the surface of the host's body. The mode of transmission of *Trichodina* sp. occurs directly through the skin between infected fish and healthy fish (Afifah *et al*., 2014).

b) *Dactylogyrus* sp.

Dactylogyrus sp. is one of the parasites that belong to the monogea group. *Dactylogyrus* sp. found during the study has the characteristics of an elongated flat body, has four protrusions on the anterior part where on the anterior part there is a *sucker* (sucking tool) and 2 eye spots, the anterior end is shaped like a triangle, has two pairs of anchors, and there is a posterior haptor on its body. The body shape of *Dactylogyrus* sp. is transparent so that the internal organs look brownish and the shape of the intestine is not clear. According to Irwandi *et al*. (2017), stated that *Dactylogyrus sp.* has the characteristics of an elongated flat body with a suction device and *ophisthaptor* on the posterior part which has 14 hooks on the edge.

Figure 2. *Dactylogyrus* sp.

Dactylogyrus sp. is organ specific to the gills so that it infects more gills. In the gills there are blood capillaries so that many nutrients are needed by *Dactylogyrus* sp. besides that the gills are also respiratory organs that are directly related to the environment, can filter food particles, dissolved materials and bind oxygen so that they are very susceptible to infection with pathogenic organisms such as *Dactylogyrus* sp. (Yuli *et al*., 2017).

c) *Ichtyophtirius multifilis*

Ichtyophtirius multifilis is one type of ciliate organism that often attacks freshwater fish and causes *white spot* disease. *Ichthyophthirius multifiliis* parasites found during the study have characteristics of a round or oval shape, have cilia, and in the center of the body there is a core shaped like the letter C or horseshoe. This description is in accordance with the opinion of Hardi (2015) which states that *Ichthyophthirius multifiliis* has a round or oval shape, ciliated, and has a large macronucleus like a horseshoe or letter C.

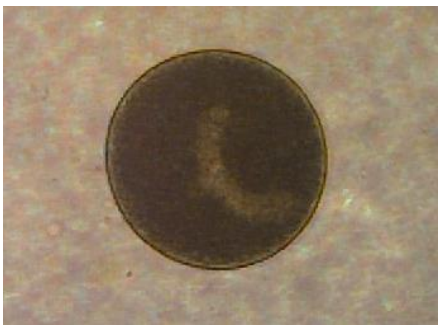

Figure 3. *I. multifiliis*

Ichthyophthirius multifiliis parasites infect the host by immersing themselves under the mucus on the skin, fins, and gills. The way the *Ichthyophthirius multifiliis* parasite attacks the host is by attaching itself to the mucus layer of the host organ, then the parasite will suck pigment cells and red blood cells in the attached organ. The infected body will experience damage and can cause death in fish (Rahmi, 2012).

d) *Argulus* sp.

Argulus sp. is also known as the fish *louse* that causes argulosis or *fish* louse disease. *Argulus* sp. parasites found in carp examination have a flat oval body shape and the body (*dorsal*) is protected by a carapace that covers almost all parts of the body. *Argulus* sp. has a pair of eyes, two pairs of antennae, mouth, and suckers on the anterior part and has three segments in a pair of swimming legs on the posterior part. The description of the characteristics of *Argulus* sp. is in accordance with the opinion of Harlina *et al*., 2019 which states that *Argulus* sp. has the characteristics of a flat oval-shaped body, almost all of its body is covered by a wide carapace, prominent compound eyes, antennae, and a spiny proboscis or sucking device.

Figure 4. *Argulus* sp.

The way *Argulus* sp. attacks into the host organ starts from the entry of this parasite into the aquatic environment, *Argulus* sp. has 2 compound eyes that are able to detect the host. *Argulus* sp. will attach and pierce the host's body using *stylet* and release anti-coagulant substances to inhibit blood clotting then *Argulus* sp. will suck blood from its host using *proboscis* which results in tissue damage to the host and causes infection (Nurani *et al*., 2020) .

3.2 **Prevalence and Intensity of Ectoparasites in Carp**

The identification results of 60 *carp* (*C. carpio*) from 2 ponds in Pokdakan Mina Abadi Sejahtera found that all fish were infected with ectoparasites. The types of ectoparasites that infect are *Trichodina* sp. parasite *Dactylogyrus* sp., *Ichthyophthirius multifiliis* parasite, and *Argulus* parasite. Can be seen in table 1.

Table 1.
Prevalence of Ectoparasites in Goldfish (*C. carpio*)

KL	Ectoparasites	Total Fish (Ind)	IT (Ind)	JP	Prevalence (%)	Category
1	*Trichodina* sp.	30	29	1100	96,67%	Almost Always
	Dactylogyrus sp.	30	18	39	60%	Very often
	Ichthyophthirius multifiliis	30	7	28	23,33%	Often
	Argulus sp.	30	9	20	30%	Generally
2	*Trichodina* sp.	30	30	840	100%	Always
	Dactylogyrus sp.	30	13	21	43,33%	Generally
	Ichthyophthirius multifiliis	30	7	13	23,33%	Often
	Argulus sp.	30	11	36	36,67%	Generally

Description: KL = pond, IT = infected fish

Based on the results presented in Table 1. above, shows that the highest total prevalence value of parasite infection is *Trichodina* sp. in second place *Dactylogyrus* sp., third place *Argulus* sp., and the lowest value is *Ichthyophthirius multifiliis*. The results of the ectoparasite intensity value, namely the parasite *Trichodina* sp. with the following values, can be seen in Table 2.

Table 2.
Ectoparasite Intensity in Goldfish (*C. carpio*)

KL	Ectoparasites	Total Fish (Ind)	IT (Ind)	Number of parasites	Intensity (Ind/head)	Category
1	*Trichodina* sp.	30	29	1100	38	Medium
	Dactylogyrus sp.	30	18	39	2	Low
	Ichthyophthirius multifiliis	30	7	28	4	Low
	Argulus sp.	30	9	20	2	Low
2	*Trichodina* sp.	30	30	840	28	Medium
	Dactylogyrus sp.	30	13	21	2	Low
	Ichthyophthirius multifiliis	30	7	13	2	Low
	Argulus sp.	30	11	36	3	Low

Description: KL = pond, IT = infected fish

Based on the results presented in Table 2. for the highest Intensity value is *Trichodina* sp., in second place *Ichthyophthirius multifiliis*, and *Argulus* sp., with the same value then the lowest value is *Dactylogyrus* sp. The high and low value of prevalence and intensity of parasites is influenced by internal factors and external factors. Internal factors include fish health condition (immune system), age, and fish size, while external factors include the state of the aquatic environment (water quality), stocking density and climate.

3.3 Water Quality Parameters of *Carp* Farming Pond *(C. carpio)*

The results of the measurement of water quality parameters are presented in Table 3 as follows:

Table 3.
Analysis of Pond Water Quality Parameters

Pond	Parameters			
	Temperature (° C)	pH	DO (mg/L)	Ammonia (mg/L)
1	28,29	7,25	4,51	0,33
2	29,92	7,38	6,88	0,24
Limit Terms	27-29[1]	6,5-8,5[2]	>4[2]	0,1[3]

Source: [1] Khairuddin *et al*. (2020);[2] Wihardi (2014);[3] Nurlina (2021)

The results showed that the 2 ponds have different measurement results with the highest average values of temperature, pH, and DO in pond 2 which are 29.92° C, 7.38, and 6.88 mg/L while for ammonia levels with the highest value is in pond 1 which is 0.33 mg/L.

The temperature is still within reasonable limits for carp survival. This is in accordance with the goldfish water quality standards according to Khairuddin *et al*., (2020), which says that the optimal temperature for goldfish life is around 27-29 ° C. pH in goldfish ponds at Pokdakan Mina Abadi Sejahtera is still within normal limits for goldfish life. Dissolved oxygen (DO) in measurements in the Pokdakan Mina Abadi Sejahtera goldfish pond is optimal for goldfish survival Ammonia in measurements of goldfish ponds at Pokdakan Mina Abadi Sejahtera is not optimal for goldfish farming.

4. Conclusion

Ectoparasites identified to attack carp in Pokdakan Mina Abadi Sejahtera were 4 species, namely *Trichodina* sp., *Dactylogyrus* sp., The highest prevalence value was obtained by *Trichodina* sp. species with a value of 98.33% (almost always), then *Dactylogyrus* sp. parasite with a value of 51.66% (very often), *Argulus* sp. parasite with a value of 33.33% (generally), and the lowest prevalence value was obtained by *Ichthyophthirius multifiliis* parasite with a value of 23.33% (often). The highest intensity value was obtained by *Trichodina* sp. species with an intensity value of 33% ind/head (moderate), then *Ichthyophthirius multifiliis* parasites with a total intensity value of 3 ind/head (low), *Argulus* sp. parasites with a total value of 3 ind/head (low), and the lowest intensity value was obtained by *Dactylogyrus* sp. parasites with a total intensity value of 2 ind/head (low).

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