Identification of Ectoparasite Infection in Tilapia (Oreochromis niloticus) Based on Water Quality in Rawa Pening

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Abstract

Testing of ectoparasites on water quality in infections that occured in tilapia in aquaculture activities in Rawa Pening. The purpose of this study was to determine the exposure to the abundance of ectoparasite bacteria that infected the growth of tilapia in Rawa Pening. This study used experimental method and purposive sampling with data processing in a descriptive survey. The data analysis used was analysis of variance (ANOVA) with the aim of knowing the effect of sampling and the parameters tested, this test was carried out 4 (four) times for water quality and ectoparasite observations 3 (three) times for testing to obtain the accuracy of data sampling. The results of this study showed that there was an infection with levels of ectoparasites identified from the types of Streptococcus sp, Lernaea sp, Aeromonas sp, and Trichodina sp. These bacteria attack fish with the highest number or total exposure in the Tuntang area. The reason was, currently water hyacinth was being cut down as one of the local government programs to reduce the blooming of water hyacinth (Eichhornia crassipes) of 7.92 mg/L, pH levels 7.59, ammonia levels 10-20 mg/L and nitrate levels 0.5 mg/L were still in optimal conditions from the results carried out.

Keywords: *Ectoparasites, Sampling Location, Tilapia, Water Quality.*

Introduction

The main disease that threatens the cultivation of tilapia (*Oreochromis niloticus*) with various bacterial infections (Ashari et al., 2014; Putra et al., 2017). Studies on tilapia disease (*O. niloticus*) are usually only aimed at characterizing single bacterial pathogens but haven't been realized regarding the understanding of co-occurring infections. The reality of disease outbreaks in cultivation is most likely caused by several pathogenic infections, the concurrent infection between these pathogens has not been maximized. Disease outbreaks occur every year in tilapia (*O. niloticus*) cultivation units, both in the community of fish farmers or from the Fisheries Center under the auspices of the Government. This caused high mortality and economic losses. Some fish farmers only identify the disease morphologically and visually physically, so that the administration of vitamins and chemical drugs only reduces the mortality rate from the disease but cannot eliminate the disease. The level of each fish disease came from internal and external factors. Internal factors were more complex than external factors. Sick fish usually show severe clinical symptoms that resemble bacterial infections but are not specific for any single infection.

Diagnosis was the first step in an effort to recognize a type of disease or the cause of a disease. Changes in fish conditions caused by pathogenic organisms or the environment in a short time often visually didn't show any real symptoms so that they were difficult to detect, even though physiological changes have occurred in fish that are attacked by disease. Fish cultivation in KJA has developed rapidly, including in Rawa Pening where most of the cultivation activities in KJA were carried out both from upstream waters and along the edge of the swamp. Waste originating from KJA will affect the quality of the waters in Rawa Pening, this was triggered by the metabolic activity of fish, fishermen's activities to find fish and overhaul of water hyacinth and weeds in Rawa Pening

waters. The importance of maintaining water quality so as to maintain environmental ecosystems, especially for fish farming and minimizing the blooming of water hyacinth (*Eichhornia crassipes*). The effect of water pollution from human activities and natural factors, so this test was to determine the infection of ectoparasites on water conditions in Rawa Pening cages as a medium for tilapia (*O. niloticus*) cultivation.

Materials and Methods

The research was conducted on 27 September – 22 October 2021 at the Central Java Fish and Environmental Health Testing Laboratory in Semarang City, for water quality testing and ectoparasite testing carried out at the Ambarawa Fish and Environmental Health Testing Laboratory in Ambarawa.

Testing for ectoparasites of tilapia (*O. niloticus*) for consumption with a length of about 15-20 cm and a weight of 30-50 grams, with the equipment used in the study, including: digital thermo thermometer, pH meter, DO meter, microscope, sectio set, tub plastic, cover glass, object glass. Analysis of water quality in cages based on direct observations at the KJA location for tilapia (*O. niloticus*) cultivation in Rawa Pening.

This study used experimental methods and purposive sampling. Descriptive survey data processing, testing was carried out 4 times for water quality. Observation of ectoparasites 3 times with direct sample observation in the laboratory. Descriptively analyzed data include abundance and water quality prevalence data.

Testing for ectoparasites by taking disease identification variables on the scales, gills, and tail mucus. The tilapia (*O. niloticus*) will be taken one by one and drop a little water and then tested to obtain the physical identification parameters of ectoparasites using a microscope with a magnification scale of 40x. The test was carried out with 3 repetitions to maximize observations at each different location point.

Water quality testing carried out directly at the location, namely temperature, pH, DO, ammonia, and nitrate. However, ammonia and nitrate were tested more complexly at the Fish and Environmental Health Testing Laboratory in Semarang City. Taking temperature measurement data using a digital thermometer by spraying aquadest first and then dipping into water in aquaculture floating net, measured pH using a pH meter by spraying aquadest first then dipping into the floating net, measuring DO using a DO meter which was previously sprayed with distilled water before being dipped in floating net with a depth of 10-15 cm above the water surface. Tests for ammonia and nitrate were carried out at Fish and Environmental Health Testing Laboratory used spectrophotometry.

Water quality parameter

According to Wirawan et al. (2018), the water quality parameters measured include: The temperature was observed using a digital thermo thermometer, dissolved oxygen (DO) was measured using a DO meter, pH was observed using a pH meter by immersing directly into water with a depth of about 10-15 cm below the water surface for + 60 seconds, then read the scale on the thermometer while still in the water and the results are recorded, while ammonia (NH3) and nitrate (NO3-) were measured by spectrophotometry by taking 1 bottle of water from the swamp at 5 test points and acclimatized to temperature cold ± -2^{o}C.

Data Analysis

Data collection based on primary sources was carried out during the research. The one-way ANOVA test was testing the variables with the hypothesis used, namely Ho was the difference between tests wasn't significant, H_a was the difference between tests was significant. If F count < F table 5%, then accept H_o. The test of the different variables was not significant where the effect of water quality on exposure to tilapia (*O. niloticus*) ectoparasites. The results of osmoregulation capacity were analyzed using one-way ANOVA with error levels = 0.05 and 0.01. If more than 0.005 means not meaningful. For the 99% confidence level, if the number was less than or equal to 0.001 it means that it was significant. If more than 0.01 means not meaningful.

Results and Discussions

a.) Ectoparasites observation

Ectoparasites were easily recognized by contamination on the body surface (Rusenda et al. 2021). Analysis of *Streptococcus* sp. was one of the pathogens that can attack freshwater fish with physical

clinical symptoms such as protruding eyes and blackish color, *Lernaea* sp. attached to the body of the fish with an anchor that pierces and develops under the skin, bleeding occured at the location where it was attached, *Aeromonas* sp as a pathogen that attacks the physical body of the fish caused bleeding in body parts such as the chest, abdomen, and base of the fins, and *Trichodina* sp ectoparasites which attacked the body surface of the gills and fins.

Table 1. Observations of Ectoparasites on Tilapia at LPKIL Ambarawa

Species	Type of Parasite	Sampling (fish body part)
Streptococcus sp.	Bacteria	Tail mucus
Lernaea sp.	Bacteria	Integument
Aeromonas sp.	Bacteria	Scale
Trichodina sp.	Bacteria	Gill and tail mucus

The results of observations can be seen that there was exposure to bacteria that cause disease, which was characterized by symptoms of tilapia such as loss of appetite, wounds on the body surface, bleeding from the gills, peeling scales, damaged tail fin, and red spots and fungus appear on the morphology of the fish. This was in accordance with Handayani et al. (2013) stated that the clinical symptoms of diseased fish were marked by bleeding (hemorrhage) and wounds on the fish's body (ulcer), passive movement of fish and decreased appetite. The results showed that the whole sample of tilapia used had clinical symptoms of body color, fins, skin and gills in normal conditions or tilapia in healthy condition. This was in accordance with (Osman et al., 2018) that healthy fish had a body morphology, a normal body shape, skin, brightly colored gills, and body color didn't change or normal.

b.) Water Quality

Temperature

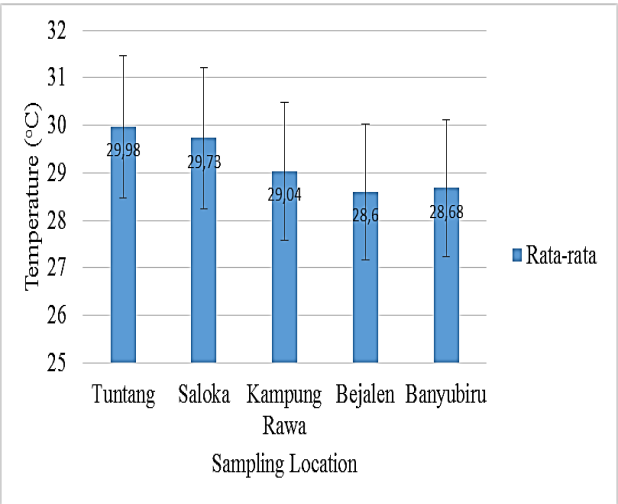

Figure 1. Average of temperature in Rawa Pening

From the data above, it appears that the highest temperature occurred at the Tuntang location at 33.5^{o}C and the lowest temperature occurred at the Tuntang location at 26.6^{o}C. Water quality at the point of cultivation in cages based on temperature indicators under normal conditions, namely with an average of 1 month observation with 10 sampling times, namely Tuntang at 29.98 ^{o}C, Saloka at 29.73 ^{o}C, Kampung Rawa at 29.04 ^{o}C, Bejalen of 28.6 ^{o}C, and Banyubiru of 28.68 ^{o}C. Based on testing using SPSS (*Statistical Product and Service Solutions*) on the analysis of Duncan and Anova test results with = 0.05 in the Tuntang area of 28.94 ^{o}C ± 0.846, the Saloka area 28.64 ^{o}C ± 0.846, the Kampung Rawa area 28.94 ^{o}C ± 0.846, the Bejalen area 28.53 ^{o}C ± 0.846, Banyubiru area 28.64 ^{o}C ± 0.846. The condition of the pening swamp waters at temperature measurement has an average range of 29.20^{o}C so that it was still in the optimal temperature for tilapia (*O. niloticus*). According to Azhari et al., 2018 the optimal temperature for cultivation was 25-30^{o}C, so that the dizziness swamp was still in a normal temperature state for tilapia (*O. niloticus*) cultivation in cages. The high and low temperature was thought to be influenced by the solar radiation factor, namely the intensity of the sun's rays on the waters.

DO (Dissolved Oxygen)

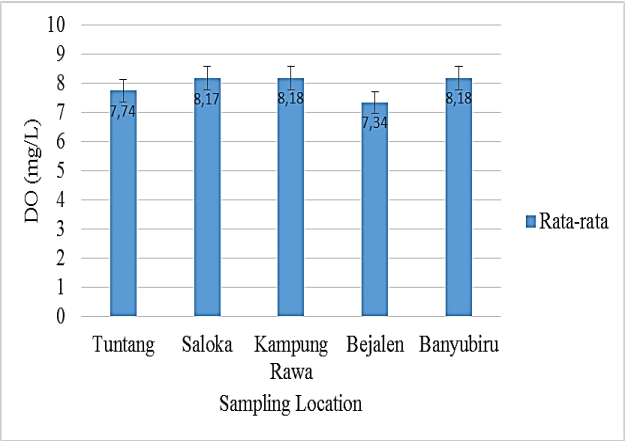

Figure 2. Average of Dissolved Oxygen in Rawa Pening

From the data on the average value of the DO measurement, it is known that the highest value occurred in Saloka (13 mg/L) and the lowest value was measured in Tuntang (5.99 mg/L). The average value of DO in cages with measurements 10 times in 1 month with 4 repetitions showed the value at the Tuntang location was 7.74 mg/L, Saloka was 8.17 mg/L, Kampung Rawa was 8.18 mg/L, Bejalen is 7.34 mg/L, and Banyubiru is 8.18 mg/L. Based on testing using SPSS (Statistical Product and Service Solutions) on the analysis of Duncan and Anova test results with = 0.05 in the Tuntang area 7.7075 mg/L ± 0.850, Saloka area 8.1375 mg/L ± 0.850, Kampung Rawa area 7.9775 mg/L ± 0.850, Bejalen area 8.1700 mg/L ± 0.850, Banyubiru area 8.2675 mg/L ± 0.850. Based on the measurement results, it was obtained that the average DO value in Rawa Pening was 7.92 mg/L, which is still well categorized in fish farming activities in cages. Meanwhile, if the dissolved oxygen content is below 3 mg/L it can cause a decrease in the growth rate of fish and according to Marganof (2007) the rate of oxygen consumption in KJA aquaculture is required to be twice as high as the rate of oxygen consumption in aquaculture ponds.

pH

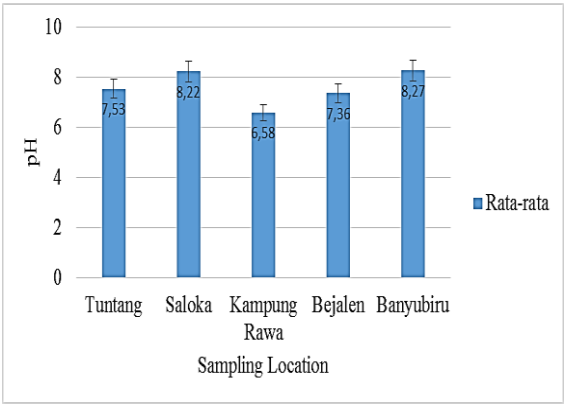

Figure 3. Average of pH in Rawa Pening

From the data above, it was known that the highest pH value was in the Tuntang location of 8.97 and the lowest value was in the Kampung Rawa location of 7.5. The average value from each location was obtained at the Tuntang location at 7.53, at the Saloka location at 8.22, at the Kampung Rawa location at 6.58, at the Bejalen location at 7.36, and at the Banyubiru location at 8.27. Based on testing using SPSS on the analysis of Duncan and Anova test results with = 0.05 in the Tuntang area 8.4075 ± 0.523, the Saloka area 8.24 ± 0.523, the Kampung Rawa area 8.1625 ± 0.523, the Bejalen area 8.1750 ± 0.523, Banyubiru area 8.2650 ± 0.523. The average pH value of Rawa Pening waters was 7.59, which was included in the normal scale. The difference in pH values every month that occured during the study was thought to be due to the influence of organic and inorganic materials present in the waters, which according to Sofyan et al. (2011), fluctuations in pH values were influenced by the presence of organic and anorganic waste in the floating net cultivation area.

Ammonia dan Nitrate

Table 9. Average of Ammonia dan Nitrate

Parameter	Result					Optimum
	Tuntang	Saloka	Kampung Rawa	Bejalen	Banyubiru	
Amonia (NH_3N) (mg/L)	4,65	>20	2,45	11,7	2,5	10-20
Nitrate (NO_3N) (mg/L)	>2,0	>2,0	>2,0	>2,0	2	0,5

Source : Primary Data Analysis of Central Java Fish and Environmental Health Testing Laboratory in Semarang City (2021)

The results of the tests that have been carried out show that the optimal identified ammonia value in the Saloka and Bejalen area was 11.7 mg/L > 20 mg/L in accordance with the optimal value standard of the laboratory. The results showed that the Tuntang, Kampung Rawa, and Banyubiru areas had values below 10 mg/L below the optimal value of the provisions of the applicable threshold. Ammonia was an important parameter in marine cage aquaculture because it can be considered as one of the deadliest poisons in aquaculture. The results of the nitrate test carried out obtained a value of 2 mg/L where the optimal value of the water nitrate threshold was 0.5 mg/L based on the primary data at Central Java Fish and Environmental Health Testing Laboratory. Tested at 5 point locations had a fairly high nitrate content protection. Wardoyo (1982) suggested that the range of nitrate levels of 0.3-0.5 mg/L was good for the growth of organisms and >3.5 mg/L can harm the waters. Based on PP No. 82 of 2001, the NO3 content for fish was 10-20 mg/L. Nitrate was a source of nitrogen for plants which was then converted into protein (Effendi, 2003).

c.) Bacterial Abundance

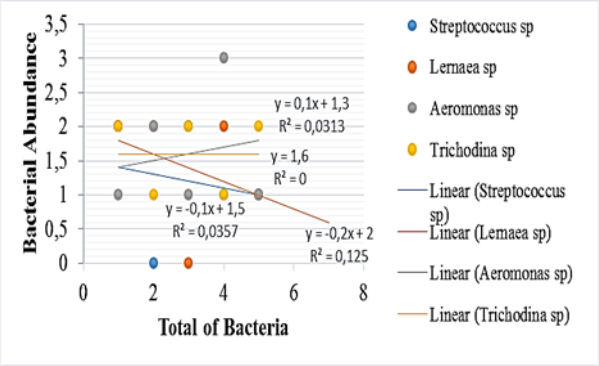

Figure 4. Bacterial Abundance Variable Linear Regression Equation

Conclusion

The results showed exposure to ectoparasites that infect tilapia culture, namely Stretococcus sp, Lernea sp, Aeromonas sp, and Trichodina sp with water quality testing values of temperature variables 29.20^{o}C, DO 7.92 mg/L, pH 7.59 as well as ammonia and nitrate. classified as normal. It was suspected that there were external influences outside the observation and testing variables that affected the presence of parasites that infected tilapia.

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