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Water Quality Analysis and Microbiota of Catfish Pond (*Pangasianodon hypopthalmus*) Applied by Photosynthetic Bacteria (*Rhodobacter* sp. and *Rhodococcus* sp.)

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Abstract

Adi Suriyadin, Heny Budi Utari and Sinung Rahardjo. 2020. Water Quality Analysis and Microbiota of Catfish Pond (*Pangasianodon hypopthalmus*) Applied by Photosynthetic Bacteria (*Rhodobacter* sp. and *Rhodococcus* sp.). *Aquacultura Indonesiana, 21 (2): 56-67.* Intensive aquaculture activities are critical to increase production, but in the intensive cultivation process got various problems arise, especially those related to water quality and fish health. Therefore this study aims to analyze the water quality and microbiota applied by photosynthetic bacteria *(Rhodobacter* sp. and *Rhodococcus* sp.*)* in catfish ponds *(Pangasianodon hypopthalmus)*. Research was using a completely randomized design (CRD) consisting of two treatments of 0.2 ml/L, 0.5 ml/L of photosynthetic bacteria and a control with three replications. The results showed that the application of photosynthetic bacteria *(Rhodobacter* sp. and *Rhodococcus* sp.*)* in catfish ponds *(Pangasianodon hypopthalmus)* can improve water quality, especially water chemical parameters, seen in the a decrease in the value of nitrite (NO_2), Total Ammonia Nitrogen (TAN) and Total Organic Matter (TOM). Beside, biological parameters were also seen, namely the depletion of *Cyanophyta* (Blue Green Algae / BGA) plankton types and also the depressed percentage of the Total *Aeromonas* Count (TAC).

Keywords: Water Quality; Microbial Community; *Rhodobacter* sp.; *Rhodococcus* sp.; *Pangasianodon hypopthalmus*

Introduction

Freshwater fish that are widely cultivated and have high economic value are catfish, one of which is catfish *(Pangasianodon hypopthalmus)*. Catfish Is one of the famous freshwater consumption fish (Lukistyowati, 2012). According to Kordi (2010), many people maintain catfish not only to complete the nutritional needs of the family, but also profited as a business to earn income. Catfish has meat that is classified as tasty and delicious. In addition, this fish contains high protein and low cholesterol. Catfish contains 68.69% protein and 5.8% fat (Andayani et al., 2017). Therefore, to meet the high demand for the needs of catfish, intensive cultivation is carried out with stocking densities and high feeding rates.

Intensive aquaculture activities are very important to increase production, but in the intensive cultivation process got various problems arise, especially those related to water quality and fish health. The remainder of the feed that is not consumed and the residual waste of fish metabolism causes the decline in water quality in the cultivation process. This results in the control of pathogenic microbes in intensive cultivation systems becoming difficult to do (Verschuere et al., 2000). Water quality is an important factor in aquaculture, because it is not only for fishes but also for all life in these waters (Khotimah et al., 2016).

Various methods are used to overcome these problems, such as the use of antibiotics for the treatment of fish that are sick due to pathogenic microbes. According to Setijahningsih et al. (2011), antibiotics use will result in the emergence of antibiotic resistant strains into the waters. Therefore, various parties try to develop a biological control (probiotic) related to the decline in water quality and the emergence of diseases which are the main obstacles in aquaculture activities.

According to Purwanta and Firdayati (2002), the probiotic is a type of bacteria added to the environment to improve the quality of the environment by breaking down organic matter into minerals and turning toxic compounds into non-toxic compounds such as ammonia and nitrite into free nitrogen compounds. Furthermore according to Mansyur and Tangko (2008), the application of probiotics through maintenance media aims to improve water quality through biodegradation, maintaining microbial balance and controlling pathogenic bacteria. The provision of probiotics in maintenance media is expected to improve water quality by breaking down residual feed that settles and fish faeces at the bottom of the water. In addition, probiotics give benefit for the host which consumes them (Khasani, 2007). Probiotics that can improve the water quality and the environment are included in the type of photosynthetic bacteria (Trisna et al. 2013).

Photosynthetic bacteria are phototrophic, able to live in low oxygen content and utilize light waves (sunlight) for excite the photosystem membrane.. The electron donors used by photosynthetic bacteria groups are organic and inorganic compounds such as H_2S, nitrite, Fe_2 and ammonia (Widiyanto, 2001). Photosynthetic bacteria using source C can convert complex organic compounds into complex polysaccharides (Hiraishi et al., 1995).

Based on the description above the water quality in the unwell media maintenance will give an unfavorable effect for cultivated fish. Therefore it is necessary to maintain the stability of water quality in the maintenance container. It is necessary to conduct a research to analyze water quality and microbiota that applied photosynthetic bacteria (*Rhodobacter* sp. and *Rhodococcus* sp.) in catfish ponds (*Pangasianodon hypopthalmus*).

Materials and Methods

The Time and Place of the Research

This research was conducted for 63 days, starting on September 17 to November 18, 2019 at Tirto Bumi Agung Company, Karang Dagangan Village, Bandar Kedung Mulyo District, Jombang, East Java Province. This company has 4 hectares area consisting of 197 grow-out catfish pond. Water quality analysis in this study was conducted at the Animal Health Service Laboratory (AHS), PT. Central Proteina Prima, Sepanjang, Sidoarjo, East Java area.

Research Tools and Materials

The research tools include pH meter, DO meter, Secchi disc, Microscope, Haemositometer, Spectrophotometer and titration instrument. The sample testing was conducted at the Animal Healt Services Laboratory of PT. Central Proteina Prima. Research materials include catfish from the pool CV. Tirto Bumi Agung, fish feed from PT. Central Proteina Prima with nutritional content (20-22% protein content, 4-6% fat, 5-7% fiber and 11-13% water content) and product of photosynthetic bacteria (*Rhodobacter* sp. and *Rhodococcus* sp.) known as Super PS was produced by PT. Marindolab Pratama, Serang.

Research Design

The research was conducted in six-month-old catfish with an average individual weight of 400 g/fish. Catfish ponds were nine ponds, with an area of 400 m^2 and a depth of 2 m. The catfish seeds used come from Bogor, with an initial stocking density of 20 individuals / m^2. Feeding is carried out ad libitum with frequency of feeding twice a day. The design used in this study was a completely randomized design (CRD), which consists of two treatments and one control with each treatment of three replications. The treatment of probiotics in aquaculture ponds was carried

out daily with a one-time frequency, namely in the morning, at precisely 08.00 WIB. The dosage of treatment used is as follows:
Treatment A = 0.2 ml/L of photosynthetic bacteria.
Treatment B = 0.5 ml/L of photosynthetic bacteria.
Treatment C = Without the use of photosynthetic bacteria (control).

Data Collection

The study was conducted by field observation, application and data collection in both the aquaculture pond and the laboratory. Water quality parameters analyzed include physical, chemical and biological parameters. Daily physical parameters of water include temperature; potential hydrogen (pH) and brightness, while the chemical parameters of the day are Dissolved Oxygen (DO), the daily sampling point is close to the outlet door with a measurement frequency twice a day at 06.00 and 17.00 WIB. Basic weekly chemical parameters are nitrite (NO_2), Total Organic Matter (TOM) and Total Ammonia Nitrogen (TAN). Other weekly biological parameter analysis is the calculation of plankton, identification of plankton species and comparison of Total *Aeromonas* Count (TAC) with Total Bacteria Count (TB). The weekly sampling point is the same as the daily sampling point, which is close to the outlet door, but the sampling method is 20 cm from the bottom of the water.

Data Analysis

The data obtained were analyzed using the Analysis Of Variance (ANOVA). If the effect is significantly different, it will be followed by Duncan further tests using calculations based on a 95% confidence level.

Results

The results showed that the use of probiotics photosynthetic bacteria in the water of catfish pond (0.2 ml/l; 0.5 ml/l treatment and control), several water quality parameters such as temperature, potential hydrogen (pH), Dissolved Oxygen (DO), nitrite (NO_2) and Total Ammonia Nitrogen (TAN) showed an improvement trend, although not significantly different (P> 0.05). Water quality data during the study is presented in Table 1.

Table 1. The results of statistical analysis of the water quality data for catfish culture.

Water Quality	Time	Treatment			Reference
		Control	0.2 ml/L	0.5 ml/L	
Temperature (°C)	Morning	28.52 ± 0.13^a	28.43 ± 0.19^a	28.42 ± 0.16^a	25 - 32 °C (Munisa *et al.*, 2015)
	Afternoon	30.08 ± 0.09^a	29.85 ± 0.07^a	30.02 ± 0.08^a	
	Rings	1.56	1.42	1.60	
Potential Hydrogen (pH)	Morning	7.18 ± 0.03^b	6.90 ± 0.04^a	6.86 ± 0.02^a	6.5 – 9.0 (Munisa *et al.*, 2015)
	Afternoon	7.21 ± 0.04^a	7.13 ± 0.04^a	7.08 ± 0.03^a	
	Rings	0.03	0.23	0.22	
Brightness (cm)	Morning	8.88 ± 0.30^a	14.11 ± 0.51^b	9.33 ± 0.50^a	> 25 cm (NSA : 01-6483.3-2000)
Dissolved Oxygen (mg/L)	Morning	0.24 ± 0.03^a	0.26 ± 0.03^a	0.29 ± 0.02^a	2 – 7 mg/L (Khotimah *et al.*, 2016)
	Afternoon	1.82 ± 0.19^a	2.56 ± 0.30^b	2.78 ± 0.19^b	
	Rings	1.58	2.30	2.49	
TOM (mg/L)	Morning	447.22 ± 31.14^b	314.00 ± 27.32^a	351.66 ± 41.11^{ab}	<50 mg/L (Chandra, 2008)
TAN (mg/L)	Morning	4.25 ± 0.44^a	3.37 ± 0.66^a	3.79 ± 0.78^a	< 0.2 mg/L (Boyd, 1990)
NO_2 (mg/L)	Morning	0.31 ± 0.10^a	0.18 ± 0.04^a	0.26 ± 0.07^a	< 1 mg/L (NSA : 01-6483.3-2000)

The average value on the same line with different superscript letters shows significantly different values (P <0.5)

Likewise, the results of the analysis of total plankton (Table 2) and total plankton *Cyanophyta* (Table 3), namely the suppression of the amount of pankton in the treatment of photosynthetic bacteria, although not significantly different (P> 0.05).

Table 2. The results of statistical analysis of total plankton in catfish culture

Plankton	Treatment		
	Control	0.2 ml/L	0.5 ml/L
Total Plankton (x 10^4)	173.14 ± 17.04^b	128.85 ± 9.91^a	145.79 ± 9.53^{ab}

The average value on the same line with different superscript letters shows significantly different values (P <0.5)

Table 3. The results of statistical analysis of the total number of *Cyanophyta* plankton (BGA).

Cyanophyta (*Blue Green Algae*/BGA)	Perlakuan		
	Control	0.2 ml/L	0.5 ml/L
Anabaena	3.62 ± 1.07^a	1.70 ± 0.67^a	3.37 ± 0.76^a
Chroococcus	8.31 ± 0.47^b	1.80 ± 0.59^a	4.19 ± 1.48^a
Merismopedia	27.74 ± 6.98^a	17.60 ± 11.58^a	22.89 ± 3.06^a
Oscillatoria	61.37 ± 7.48^a	53.07 ± 10.75^a	48.52 ± 13.64^a

The average value on the same line with different superscript letters shows significantly different values (P <0.5)

While the comparison of the percentage of Total *Aeromonas* Count (TAC) and Total Bacteria Count (TBC) is presented in Figure 1. that is, there is an emphasis on the percentage of total *Aeromonas* counts in the treatment of photosynthetic bacteria compared to controls.

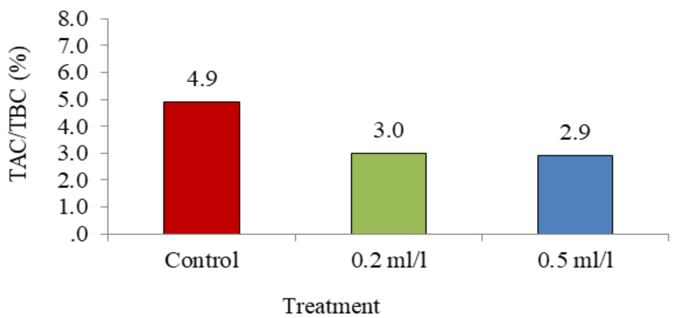

Figure 1. Comparison of Total Aeromonas Count with Total Bacteria Count from catfish culture pond after administration of photosynthetic bacteria. This graph shows that the photosynthetic bacteria treatment was able to suppress the development of Aeromonas bacteria in catfish culture.

Discussion

Water quality in a place is very important in the development of living things there (Ghufron, 2010). Water quality can affect the body of fish and grow disease is also not a substance that causes stress on fish. Environmental conditions that are not in accordance with the needs of fish can cause pressure that will increase the attack (development) of pathogenic bacteria (Puspasari, 2010).

The results of data analysis, the water temperature in the morning and evening in the 0.2 ml/L treatment ranged from 28.43-29.85 ^oC, while the 0.5 ml/L treatment was 28.42-

30.02 °C and control was 28.52-30.08 °C. The water temperature during the study showed a value that tended to be stable or still in normal conditions for catfish culture. This is consistent with the statement of Munisa et al. (2015), which states that the optimal temperature for catfish culture ranges from 25-32 °C. Temperature is a very influential factor on growth, metabolic rate and appetite for fish and fish survival. Graph of daily data of water temperature for catfish culture grouped in weekly from both treatment and control is presented in Figure 2.

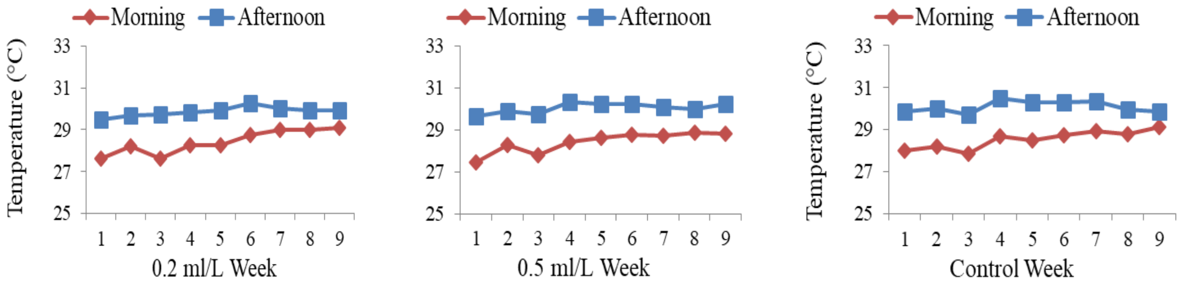

Figure 2. Daily data of catfish culture water temperature grouped in weeks after photosynthetic bacteria treatment compared to controls. The graph does not show the difference between the photosynthetic and control bacterial treatments.

The results of data analysis, it shows that the pH value fluctuation is more stable for the treatment of 0.2 ml/L and 0.5 ml/L compared to the control. The morning and evening pH values in the 0.2 ml/L treatment ranged from 6.90-7.13, while the 0.5 ml/L treatment ranged from 6.86-7.08 and controls were 7.18-7.21. In the control of pH fluctuations, it tends to close between morning and evening, this indicates that the acidity of the pond tends to be higher, even though there is a plankton photosynthesis process. According to Boyd (2016), a small part of the organic material will be used by fish (10%) while the rest is converted into carbon dioxide and water through the respiration process of cultivated species and other biota. The tendency of the pH value from the treatment of photosynthetic bacteria in the water stabilizes plankton growth during the day during the photosynthesis process and prevents oxygen consumption at night because photosynthetic bacteria do not need oxygen as their life nutrient but require other non-oxygen components such as nitrogen and organic compounds such as H_2S, nitrite and ammonia (Widiyanto, 2001). Treatment and control pH values are still in normal conditions with a range that can be tolerated by catfish. The optimal pH range for catfish according to Munisa et al. (2015), is 6.5-9.0. Graph of daily data pH of catfish culture water which is grouped in weekly from both treatment and control is presented in Figure 3.

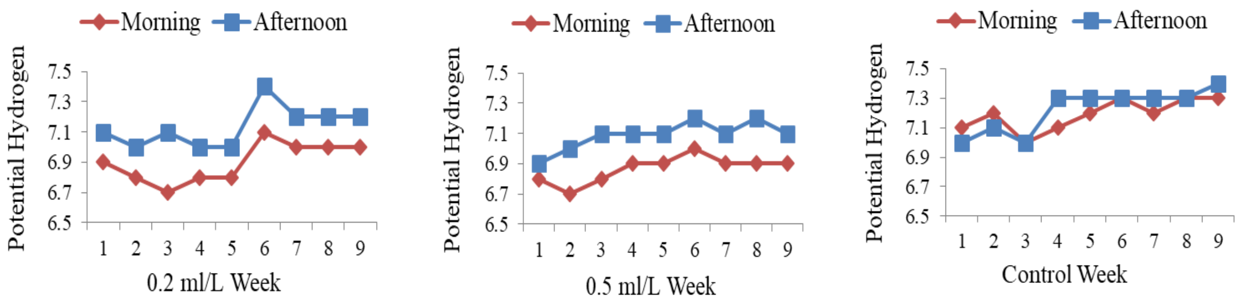

Figure 3. Daily data of catfish culture water pH grouped in weekly after photosynthetic bacteria treatment compared to controls. From these data, it shows that the photosynthetic bacteriatreatment gave a normal daily difference compared to the control which tended to dock between morning and evening pH.

The results of data analysis, water brightness parameters showed differences in both the use of photosynthetic and control bacteria. Water brightness in 0.2 ml/L treatment was 14.11±0.51[b] cm, higher than the control (8.88±0.30[a]) cm and 0.5 ml/L treatment (9.33±0.50[a]) cm. The brightness value in the 0.2 ml/L treatment indicates that there is a correlation between the use of photosynthetic bacteria in pond water which can reduce the value of the plankton population. In line with the role of photosynthetic bacteria as bacteria that utilize sunlight energy such as plankton, it was explained by Zaborsky (1998) that photosynthetic bacteria utilize photons from sunlight. The light energy by these bacteria will be converted into electron potential energy and then form ATP (Adenosina trifosfat**)**, in the next process the electrons are raised or transferred to reduce feredoxin which is an electron carrier to nitrogenase (an enzyme that can produce hydrogen). The ATP product is supplied to the enzyme along with an electron carrier. The use of sunlight competes with phytoplankton so that the number of phytoplankton has decreased. On the other hand, the increasing concentration of bacteria in the 0.5 ml/L treatment should be in line with the decrease in the plankton population, but the brightness is even lower, this is possible because the decreasing number of plankton will increase the particles that interfere with the penetration of sunlight to the bottom of the pond if no discharge of bottom water in ponds (Jhon et al. 1997). Graph of daily water brightness data grouped in weekly from both treatment and control is presented in Figure 4.

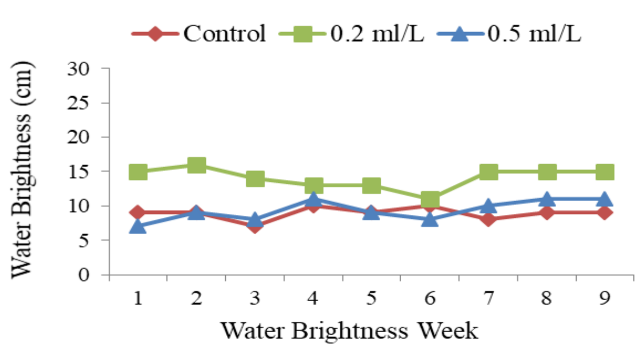

Figure 4. Daily data on water transparency of catfish culture grouped in weeks after photosynthetic bacteria was administered. From the graph, 0.2 ml/L treatment gave the best results compared to 0.5 ml/L treatment and control.

The results of data analysis, it shows that the DO value in the morning of both treatments and controls shows a value that is not significantly different (P>0.05), namely 0.2 ml/L (0.26±0.03[a]) mg/L treatment, treatment 0.5 ml/L (0.29±0.02[a]) mg/L and control (0.24±0.03[a]) mg/L. DO is measured at the bottom near the discharge of the catfish pond so it tends to have a lower value. The evening DO value of the two treatments showed significantly different than the control (P<0.05), with a value that was increasing compared to the morning, namely treatment 0.2 ml/L (2.56±0.30[b]) mg/L, treatment 0.5 ml/L (2.78±0.19[b]) mg/L and control (1.82±0.19[a]) mg/L due to plankton photosynthetic activity. In accordance with water brightness analysis data, the increase in DO value this afternoon is related to the plankton photosynthesis process (Effendi, 2003), where in the treatment of photosynthetic bacteria do not require oxygen as their life nutrient but require other non-oxygen components such as nitrogen and organic compounds such as H_2S, nitrite and ammonia (Widiyanto, 2001). Photosynthetic bacteria do not inhibit plankton photosynthesis but reduce the space for uptake of organic C and sunlight (Srinivas et al., 2008 and Sanchez, et al., 2004). However, the DO value in this study, both treatment and control, is still in the normal range for catfish culture in accordance with Khotimah et al., (2016), that the optimal DO for catfish culture is between 2.0-7.0 mg/L. Graph of daily dissolved oxygen data grouped by week from both treatment and control is presented in Figure 5.

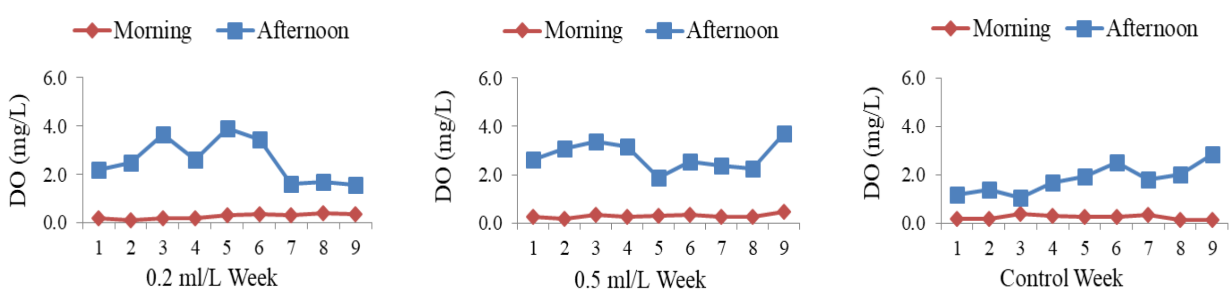

Figure 5. Daily data of dissolved oxygen grouped in weeks after photosynthetic bacteria treatment versus control. These data indicate that the two photosynthetic bacteria treatments gave a higher DO effect in the afternoon by the photosynthetic activity of plankton compared to the control.

The value data for Total Organic Matter (TOM) from Table 1, shows that both treatment and control have a high enough value for catfish culture. The TOM value in the photosynthetic bacteria treatment of 0.2 ml/L was 314.00±27.32[a] mg/L and in the 0.5 ml/L treatment was 351.66±41.11[ab] mg/L, both treatments had a value that tended to be lower than the control (447.22±31.14[b]). Photosynthetic probiotic treatment, especially in the 0.2 ml/L treatment, was able to assimilate carbon dioxide and nitrogen molecules (nitrogen fixation), using light as an energy source (Kobayashi, 1995). However, it is not significantly different from the 0.5 ml/L treatment, it is possible that photosynthetic bacteria play a role in breaking down inorganic C (CO_2) higher than organic nitrogen. *Rhodobacter* is a photosynthetic non-sulfur bacteria which easily decomposes at high organic C content under anaerobic conditions (Do et al., 2003). According to Chandra (2008), if a water contains more than 50 mg/L of organic matter, the effect of organic matter pollution is very significant, this illustrates that the effect of organic matter as a pollutant is quite large. The weekly data chart for total organic matter (TOM) of catfish culture from both treatments and controls is presented in Figure 6.

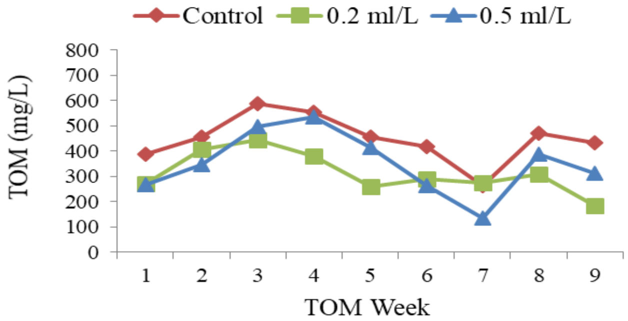

Figure 6. Weekly data on Total Organic Matter (TOM) of catfish culture after treatment of photosynthetic bacteria. These data indicate that the effect of treatment is quite high in reducing the value of Total Organic Matter compared to the control.

The results of the study, the TAN values in the two treatments of 0.2 ml/L and 0.5 ml/L showed a tendency to improve water quality compared to the control, although not significantly different (P>0.5). The TAN value of 0.2 ml/L treatment was 3.37±066[a] mg/L, and 0.5 ml/L treatment was 3.79±0.78[a] mg/L while the control was 4.25±0.44[a] mg/L. The decrease in TAN value from both treatments is possible that photosynthetic bacteria can degrade organic material in water and be used as electron donors (Widiyanto, 2001). The weekly data for TAN tended to decrease from week to week, thus the photosynthetic bacterial treatment provided better water conditions for cultivation (Figure 7). From several studies conducted on Grass carp carp, photosynthetic bacteria are used to reduce nitrogen waste in goldfish cultivation and are also used to clean organic carbon (Zhang et al., 2014).

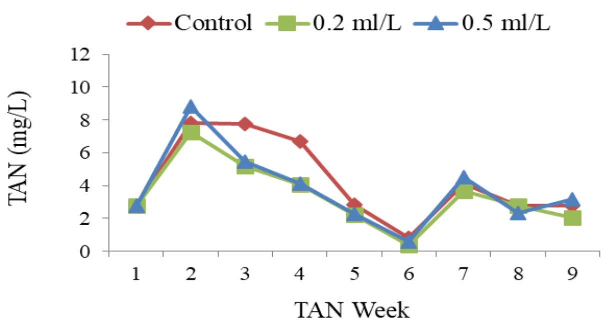

Figure 7. Weekly data of total ammonia nitrogen (TAN) in catfish culture after photosynthetic bacteria treatment. This data shows that the treatment has an effect on decreasing TAN value compared to the control.

The results of data analysis, the value of nitrite (NO_2) in 0.2 ml/L treatment is 0.18±0.04[a] mg/L, 0.5 ml/L treatment is 0.26±0.07[a] mg/L and control is 0.31±0.10[a] mg/L. Although the water nitrite value during the study did not show a significant difference (P>0.05), these data still show that the photosynthetic bacteria treatment tends to lower the nitrite value than the control. So that this photosynthetic bacteria, apart from competing with plankton and providing a higher dissolved oxygen availability in water, can also use nitrite as an electron donor (Widiyanto, 2001). The optimal nitrite value for catfish culture is <1 mg/L (NSA: 01-6483.3-2000). So that in this study the nitrite value is still within the permitted standards for catfish cultivation. Nitrite is a nitrification reaction that breaks down ammonia into nitrite by nitrosomonas bacteria. In the treatment of photosynthetic bacteria, nitrite is also used for self-multiplication reactions so that the nitrite value in cultivated water during the study decreases. Graph of weekly data for nitrite (NO_2) testing in catfish culture pond water during the study of both treatment and control is presented in Figure 8.

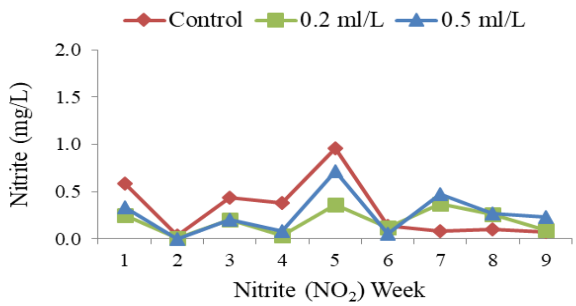

Figure 8. Weekly data of Nitrite (NO_2) testing from catfish culture ponds after photosynthetic bacteria treatment. Nitrite value decreased from treatment compared to control.

The results of data analysis, the total amount of plankton in 0.2 ml/L treatment was 128.85x10^4 individuals/ml, 0.5 ml/L treatment was 145.79x10^4 individuals/ml and controls 173.14x10^4 individuals/ml. Although this value did not show a significant difference ($P>0.05$), the total amount of plankton from the two treatments showed a lower value or an suppression of the amount of plankton compared to the control. It is possible that photosynthetic bacteria are able to break down the organic matter content in cultivated waters, besides being able to compete with plankton in the use of light energy for photosynthetic processes such as plankton (Widiyanto, 2001). The high phytoplankton density is caused by high organic matter which causes a population explosion event (blooming), which is followed by mass death (die off) of phytoplankton (Yuniarti et al., 2014). Population explosion events and mass death of phytoplankton will worsen the quality of aquaculture ponds. The weekly data graph for total plankton culture of catfish during the study from both treatments and controls is presented in Figure 9. While the results of data analysis on the percentage of plankton abundance from both treatment and control were dominated by *Cyanophyta* (Blue Green Algae/BGA) plankton, namely *Anabaena*, *Merismopedia*, *Chroococcus* and *Oscillatoria*. A description of the types of *Cyanophyta* (Blue Green Algae/BGA) plankton found during the study is presented in Figure 10.

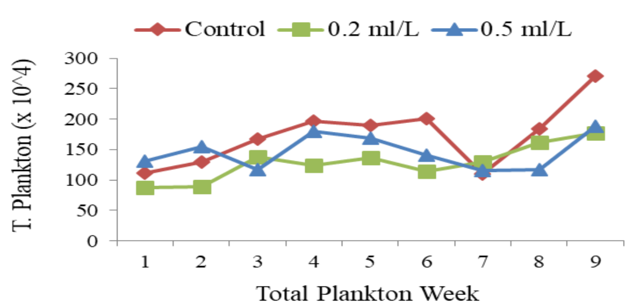

Figure 9. Weekly data on total plankton testing from catfish culture ponds after administration of photosynthetic bacteria. This graph shows that photosynthetic bacterial treatment has an effect on stabilizing plankton in culture water and reducing mass growth.

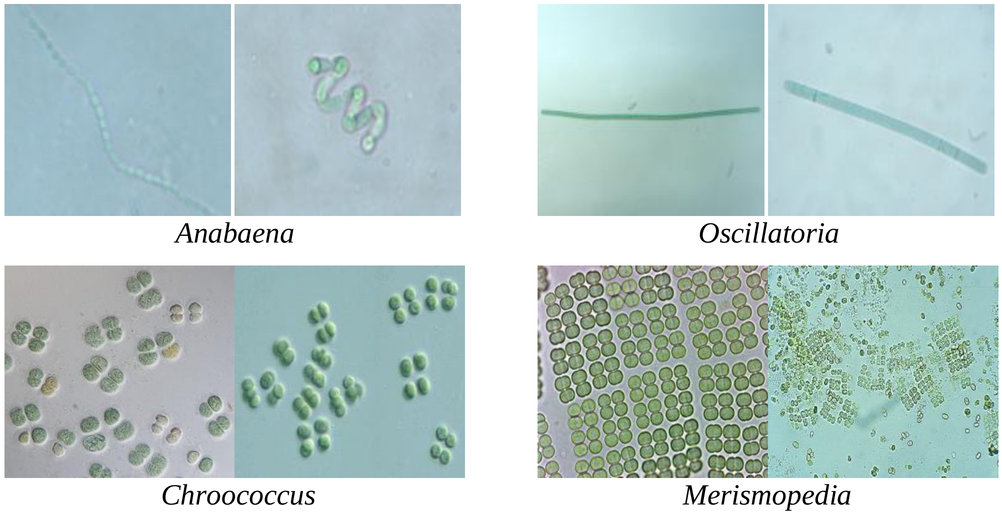

Figure 10. Types of *Cyanophyta* (Blue Green Algae/BGA) plankton found during the study from catfish aquaculture ponds from photosynthetic and control bacteria treatment.

The results of plankton group analysis, it is known that photosynthetic bacteria treatment can reduce the number of certain groups of plankton in the water. Such as the percentage of BGA in the photosynthetic bacteria treatment of 0.2 ml/L and 0.5 ml/L, which was lower than the control, especially in the 0.2 ml/L treatment. Although statistically there is no real difference. From the BGA, *Anabaena*, *Merismopedia*, *Chroococcus* and *Oscillatoria* groups experienced a decrease in treatment compared to control, so the role of photosynthetic bacteria in reducing BGA dominance is quite high, this is in line with the results of the analysis of nitrite and ammonium/TAN in waters from the analysis in this study also decreased. and in accordance with the opinion of Chandra (2008) that the factors that cause the bloom of BGA can be reduced so that the number of BGA itself decreases. *Rhodobacter* sp. and *Rhodococcus* sp. obtaining electrons from organic compounds to reduce protons to hydrogen molecules, reduction requires the enzyme nitrogenase and breaks down nitrogen to get ATP (Akkerman et al., 2002). So that with the breakdown of Nitrogen by photosynthetic bacteria, Nitrogen in the culture media water will also be reduced, so that BGA plankton will also be suppressed.

Under normal conditions, *Aeromonas* bacteria are commonly found in freshwater environments and located in the digestive tract of fish and if the fish's immune system decreases and environmental conditions deteriorate, these bacteria can infect fish, so the presence of *Aeromonas* in cultivated waters should be minimized. Based on the results of the analysis of the percentage comparison between Total *Aeromonas* Count (TAC) and Total Bacteria Count (TBC) from both treatments and controls, it was shown that the lowest percentage was found in photosynthetic bacteria treatment, namely 0.2 ml/L, namely 3.0% and treatment 0.5 ml/L was 2.9%, while the control tended to be higher, namely 4.9%. According to Mansyur and Tangko (2008), the application of probiotics through maintenance media aims to improve water quality through the biodegradation process, maintain microbial balance and control pathogenic bacteria. This can be seen clearly in the 0.2 ml/L treatment and 0.5 ml/L treatment indirectly able to keep the percentage of Total *Aeromonas* Count (TAC) not increasing when compared to controls who were not given probiotics (photosynthetic bacteria).

Conclusion

Application photosynthetic bacteria *(Rhodobacter* sp. and *Rhodococcus* sp.) With 0.2 ml/L and 0.5 ml/L treatment in catfish *(Pangasianodon hypophthalmus)* aquaculture ponds was able to improve the quality of culture water. The results showed that physical parameters: temperature was more stable, while chemical parameters such as pH value and water brightness indicated that the treatment had a good effect, especially on the value of pH fluctuation and brightness. The brightness value was significantly different between treatment and control where 0.2 ml/L water treatment was able to have an effect on reducing the amount of plankton and particles. Other water chemical parameters also showed a tendency to decrease compared to controls, such as the value of nitrite (NO_2), Total Ammonia Nitrogen (TAN) and Total Organic Matter (TOM). In addition, it is also seen in the biological parameters, namely the decrease in total plankton and the suppression of the number of *Cyanophyta* (Blue Green Algae/BGA) plankton and the suppression of the percentage value of the Total *Aeromonas* Count (TAC) pathogenic bacteria, namely Aeromonas in water.

From the results of the study, the treatment of photosynthetic bacteria 0.2 ml/L and 0.5 ml/L of water was not significantly different from the control, but there was a tendency towards improving water quality compared to control. Treatment of 0.2 ml/L of water was better than treatment of 0.5 ml/L. For further research it is suggested that the treatment dose be made more extreme so that the impact of water treatment and yellow incidence in catfish meat can also be known significantly.

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