RED WATER SYSTEM (RWS) MEDIA APPLICATION IMPACT ON WATER QUALITY IN CATFISH CULTURE USING AQUAPONICS METHOD

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ABSTRACT

This study aims to analyze the Red Water System (RWS) probiotics application on water quality in aquaponic system. The research was conducted in February - March 2016 at Ciparanje Experimental Laboratorium, Faculty of Fisheries and Marine Sciences, universitas Padjadjaran. The research used experimental method using Completely Randomized Design (CRD) with five treatments and three replications. Treatment A: RWS 7.5 µl / L / week without aquaponic probiotic treatment, Treatment B: aquaponic without RWS probiotics, treatment C: RWS probiotic addition on aquaponic media 7,5 µl / L / week, treatment D: addition of RWS probiotics on aquaponic media 10 µl / L / week, and treatment E: addition of RWS probiotics on 12.8 µl / L / week. Parameters measured include dissolved oxygen, pH, temperature, ammonia, nitrate and phosphate. The data of the research were analyzed descriptively. The results showed that the addition of RWS probiotics increased the concentration of ammonia, nitrate, phosphate and decrease dissolved oxygen, while the aquaponic model was able to decrease the concentration of ammonia, nitrate, phosphate and increase dissolved oxygen. Treatment D has the lowest average ammonia, nitrate and phosphate values of 0.55 mg / l, 0.55 mg / l and 2.34 mg / l, respectively and the highest dissolved oxygen concentration in treatment B with a value of 5. 4 mg / l while temperature and pH were relatively unchanged.

Keyword :
probiotics, red water system (RWS), water quality, catfish, aquaponic

BACKGROUND

Aquaponics is one of the culture technologies that combine fish and plant culture (Nelson, 2008). The plants in the aquaponics system function as the biofilter that absorbs and uses nitrate (N) and phosphate (P) as the fertilizer that they reduce the concentration of N and P contaminants and improve water quality (Taufik 2010). In addition to producing nitrate (N) and phosphate (P), catfish culture also produces ammonia (NH_3) as a result of metabolism and the primary protein element reshuffling that tends to cause physiological disturbance, trigger stress, and is also toxic for fish (Wijaya et al. 2014). To deal with the problem, a new innovation that collaborate aquaponics and Red Water System has appeared.

Red Water System (RWS) is a new technology in catfish culture activity that utilizes the result of Lactobacillus casei bacteria and Saccharomyces cerevisiae fungus fermentation during the culture. RWS is an extension of probiotic application in shrimp farming that is then applied in intensive catfish culture. According to Aquarista et al.. (2012), adding probiotics in the culture pond leads to decomposition organic materials in the pond that will produce lower ammonia concentration compared to the control pond. This study is supported by a statement from Murtiati et al. (2006) stating that the application of probiotics gives a positive effect on the water quality (dissolved oxygen, ammonia, nitrite, nitrate) compared to control and is able to support the Sangkuriang catfish survival. A follow up study by Hartini et al. (2013) shows that the probiotic microorganisms can also oxidize ammonia, reducing the amount of ammonia in the culture pond. This will directly help the plant to reduce the excessive ammonia in the media that cannot be absorbed by the plants. Hence, this study aims to analyze the application of RWS probiotics on water quality in aquaponics system fish culture.

MATERIALS AND METHOD

This study was conducted during the period of February–March 2016 at the Laboratory of Fish Culture, Ciparanje, Faculty of Fishery and Marine Science, Universitas Padjadjaran. The method used in this study was the experimental study using Complete Randomized Sampling (CRS) that included 5 treatments and 3 repetitions. The treatments in this study were:

Treatment A : 7.5 µl/L/week RWS solution in fiber without aquaponics (Control A)
Treatment B : aquaponics without RWS solution (Control B)
Treatment C : aquaponics with 7.5 µl/L/week RWS solution
Treatment D : aquaponics with 10 µl/L/week RWS solution
Treatment E : aquaponics with 12.5 µl/L/week RWS solution

Parameters measured included dissolved oxygen (DO), pH, temperature, ammonia, nitrate, and phosphate. The measurement was performed three times: in the beginning of the study and was repeated every 10 days of culture. The RWS solution was applied to the trial pond once every 3 days. Data analysis on the physical and chemical parameters was performed descriptively by comparing the data collected to the Indonesian National Standard (*Standar Nasional Indonesia*, SNI) for water quality parameters.

aquaponics order and identification proses

RESULTS

Figure 1. Ammonia concentartion (mg/l)

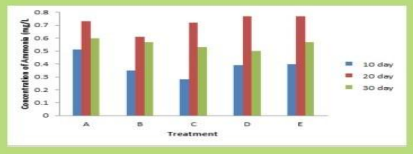


Figure 2. Nitrate concentration

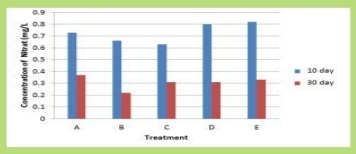


Figure 3. Phosphate concentration

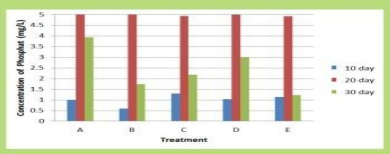


Figure 4. Dissolved oxygen

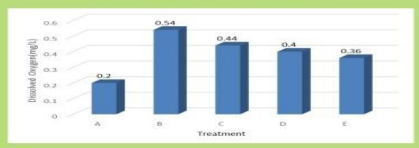
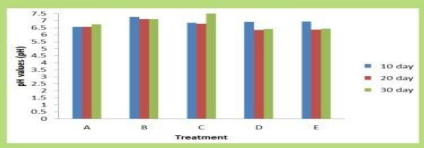


Figure 5. pH values



CONCLUSION

The addition of RWS probiotics increaseed concentration of ammonia, nitrate, and phosphate, and reducing the concentration of dissolved oxygen, while the aquaponics system can reduce the concentration of ammonia, nitrate, and phospate and increasing the concentration of dissolved oxygen

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Research Galery

REFERENCES

Aquarista, F., Iskandar dan U. Subhan. 2012. Pemberian Probiotik dengan Carrier Zeolit pada Pembesaran Ikan Lele Dumbo (*Clarian gariepinus*). *Jurnal Perikanan dan Kelautan*, 3 (4) : 133-140.

Hartini, S., A. D. Sasanti dan F. H. Taqwa. 2013. Kualitas Air, Kelangsungan Hidup dan Pertumbuhan Benih Ikan Gabus (*Channa striata*) yang Dipelihara dalam Media dengan Penambahan Probiotik. *Jurnal Akuakultur Rawa Indonesia*, 1 (2) : 192-202.

Muartiati, K., Simbolon, Wahyuni T, Subadri. 2006. Aplikasi Probiotik Pada Pembesaran Lele Sangkuriang. Jurnal Budidaya Air tawar. Sukabumi. 3(1): 1-7.

Nelson RL. 2008. Aquaponic Equipment: The Biofilter. *http://www.aquaponicsjournal. com/ docs/Aquaponic-Equipment-The-BioFilter.pdf*. (Diunduh 16 Mei 2016).

Taufik, I. 2010. *Uji Multi Lokasi Budidaya Ikan Nila dengan Sistem Akuaponik Balai Riset Perikanan Budidaya Air Tawar*. Bogor.

Wijaya, O., B. S. Rahardja dan Prayogo. 2014. Pengaruh Padat Tebar Ikan Lele Terhadap Laju Pertumbuhan dan *Survival Rate* pada Sistem Akuaponik. *Jurnal Ilmiah Perikanan dan Kelautan*, 6 (1) : 55-58