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Effect of Batik Wastewater Resulted from Biosorption Process to Blood Glucose Level on Carp (*Cyprinus carpio*)

Safira Dwi Oktaviani, Sri Lestari, Eko Setio Wibowo

Fakultas Biologi, Universitas Jenderal Soedirman
Jalan dr. Suparno 63 Purwokerto 53122
*Email: Safiradwio@gmail.com

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Abstract
Chromium from the process of coloring batik has high toxicity to the organism. The biosorption method is the heavy metal adsorption process using inactive organisms to eliminate or decrease chromium in batik wastewater. In a polluted environment, fish can be in a stressful condition that requires energy to adapt to environmental changes; high energy requirements will stimulate an increase in blood glucose levels. Chromium exposure can increase the blood glucose level on carp (*Cyprinus carpio*). This study aims to determine the effect of batik wastewater resulted from the biosorption process exposure to the blood glucose levels. This study used 4 concentrations with 6 replications. Carp is placed in a mixed water tank with batik waste resulting from biosorption. The treatment of batik wastewater produced from the biosorption process concentration are of 0%v.v^{-1}; 39,657%v.v^{-1}; 26,438%v.v^{-1}; and 13,219%v.v^{-1}. Research shows that chromium was decreasing the results obtained at K0 are 68 mg/dL, at K1 is 132 mg/dL, K2 is 127 mg/dL, and at K3 is 116 mg/dL Batik wastewater resulted from biosorption process increasing the blood glucose level in fish and accelerates the rate of expenditure on fish The optimaly concentration of batik wastewater resulted from biosorption process are tried can
Keyword : *Batik wastewater, Biosorption, Blood glucose level, Carp*

INTRODUCTION

Batik wastewater resulted from the coloring process of batik contains a lot of chemicals and heavy metals. According to Andarani *et al.* (2009), batik liquid waste contains many heavy metals such as Zn, Cr, and Pb. Besides containing heavy metals and coloring agents, batik liquid waste also contains high organic matter. Disposal directly without treatment can affect the quality of the environment and harm the organism, one of which is fish. Batik liquid waste that enters the fish's body causes disruption of the respiration process which lowers the metabolic rate (Badriyah *et al.*, 2014). Chromium is a heavy metal that is widely found in wastewater. Chromium has high toxicity based on valence values. Hexavalent chromium is chromium which has high toxicity compared to other valences (Paramita *et al.*, 2017). The chromium contained in batik waste has a level of 2 ppm.. These levels have exceeded the maximum limit of chromium in water, which is 1 ppm (Sari *et al.*, 2014).

To reduce the chromium in batik waste need to be processed, one of which is biosorption. Biosorption is an efficient and economical waste treatment process. The biosorption method is the absorption process using biosorbent. The absorption occurs because of the interaction between the active biosorbent side and the metal contained in the waste (Silalahi *et al.*, 2017). Research by Lestari *et al.* (2017), showed a decrease in the average concentration of heavy metals in batik wastewater resulted from biosorption process 63% from the initial concentration of 0.744 mg/L to 0.156 mg/L.

The toxicity of Cr hexavalent because of releasing free radical after change to Cr5+, Cr4+ and Cr3+. Chromium exposure on fish can make a stress condition causing a change in behavior. Stress conditions also cause an increase in blood glucose levels in fish, because of the signal stress that causes inhibition of the secretion of the insulin hormone which causes blood glucose to increase (Nasichah *et al*., 2016).

The research about the effect batik wastewater resulted from biosorption process to blood glucose level has naver been done. The aim is determine the effect of batik wastewater resulted from biosorption process to blood glucose level.

MATERIAL AND METHOD

Tools will be used in this research are respirometer, aquarium and Gluco-DR No 8. Materials will be used in this research are carp (*Cyprinus carpio)*, batik wastewater resulted from biosorption process from Centra Batik Sokaraja

This research will be conducted at the Experimental Station of D3 Study Program of Fishery and Marine Resource Management and Animal Physiology Laboratory in Biology of Faculty, Jenderal Soedirman University, Purwokerto. The research will be started from March until April 2019.

Research Design

The research will be conducted experimentally by Completely Randomized Design (CRD) method. Treatments consist of 4 different concentration of batik wastewater and 6 replication. The value of LC_{50} is 5.287 ppm. The experimental design is prepared as follows :

K0 = Fresh water (control)
K1 = 75% batik wastewater resulted from biosorption process from LC_{50} 39.6 $\%v.v^{-1}$
K2 = 50% batik wastewater resulted from biosorption process from LC50 26.4%v.v-1
K3 = 25% batik wastewater resulted from biosorption process from LC_{50} 13.2%$v.v^{-1}$

Procedure

Toxicity test

The used biosorbent consisted of a mixture dried of *O. sativa* straw and *P. ostreatus* baglog waste with a size of 250-425 µm. Biosorbent mixture of *O. sativa* straw and *P. ostreatus* baglog waste was weighed 300mg with a composition of 3:1, then wrapped in tea bag. Batik liquid waste is taken from the Sokaraja batik center, then adjust the pH to 5 by adding 0.1 M HCL.

Blood glucose tset

The blood glucose measurements were carried out three times using the glucose DR on the 8th day after acclimation to batik wastewater. The blood that has been taken using a syringe is dropped on the glucose strip that has been inserted into the glucose DR. The values on the glucose DR are blood glucose concentrations in mg / dL

Data Analyze

Data were analyzed using an ANOVA test on 5% significant level to determine the effect of treatment. The significantly different result will continued with the LSD test on 5% significant level.

RESULT AND DISCUSSION

The results also show the response of blood glucose content to the exposure of batik waste concentrating the results of biosorption. Complete results of blood glucose response can be seen in Table 1.

Table. 1 Average of blood glucose when treating the effect of batik wastewater resulted from the biosorption process on carp

Consentration ($\%v.v^{-1}$)	Blood glucose level (mg/dL)
0	68±0.82a
13.2	116±1.41b
26.4	127±0.82c
39.6	132±1,83d

The figures followed by different letters on the same column are significantly different (P<0.05).

In this observation, it was shown that blood glucose levels in fish were increased with increasing concentration of batik wastewater resulted from biosorption process. The result in K0 concentrations blood glucose levels were 68 mg/dL, at K3 concentrations blood glucose levels were 116 mg/dL. K2 concentrations of blood glucose levels were 127 mg/dL and at K1 concentrations blood glucose levels were 132 mg/dL. According to Nasichah *et al.* (2016), under normal conditions blood sugar levels in fish are 40-90 mg/dl.

The results of this study indicate that the concentration of blood glucose is influenced by the concentration of batik waste biosorption (P <0.5). This condition confirms that increasing the concentration of batik waste resulting from biosorption can increase blood glucose. This increase in blood sugar is possible because fish are under stress due to the disruption of oxygen demand caused by chromium in batik waste due to biosorption. According to Costas *et al.* (2008), in stress conditions fish can regulate their bodies for adaptation to environment, one of them by raising blood glucose levels in their bodies. In the study of Susanto *et al*. (2014), catfish treated with exposure to latex waste have increased blood glucose as concentration increases in the waste used. Glucose values at 0%, 1%, 6.25%, and 25% were 76.82 mg / dL, 89.78 mg/dL, 115.22 mg/dL and 138.34 mg/dL. This result is by the opinion of Sahetapy et al. (2011) which states that the concentration of waste influences fish blood glucose. The higher the concentration of waste used, the blood glucose levels in fish also increase.

According to Nasichah *et al*. (2016), under stress conditions, an increase in blood glucose levels in fish is caused by the rise in glucocorticoids, which encourages the synthesis of glucose from non-carbohydrate materials, resulting in an increase in blood glucose levels in the body. Changes to environmental conditions received by receptor organs as the signal the hypothalamus via nerves. These signals was then activate chromffin cells to suppress the enzymes involved in the process of glycogen metabolism, thereby raising blood glucose levels in fish (Masjudi *et al*., 2016).

The measurement results are 27-28ºC, and pH 6-7. Temperature and pH in this study can still support the optimal consumption of carp. This is by the opinion of Monalisa *et al*. (2010), the optimal temperature range for fish life is 27-32ºC and acidity at pH 6.5-9.0. This opinion is reinforced by the opinion of Husni *et al.* (2010) goldfish habitat in shallow waters with a temperature range of 25-30ºC, with acidity levels ranging from pH 6.00-9.00 and having a death point under acidic conditions at pH 4 and in alkaline conditions at pH 11.00.

CONCLUSION

Based on the results and discussion, it can be concluded that. Batik wastewater resulted from biosorption process increasing the blood glucose level in fish and accelerates the rate of expenditure on fish The optimaly concentration of batik wastewater resulted from biosorption process are tried can increases the blood glucose level in 39.657 ppm.

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