Bioaccumulation of Lead (Pb) in the Five Nile Tilapia (*Oreochromis niloticus* Linn. 1758) Organs at Kedung Ombo Reservoir, Central Java

Abstract

Lead (Pb) is the metal which is often found in paint, ink, pesticide, and fungicide. The metal is able to enter into water bodies, increasing pb concentration in waters. Fish can uptake Pb from its surrounding environment. Increased Pb level in fish body can result in harmful effect. Transfer of the metal by food chain leads to increased metal in human body. This research aims to study Pb accumulation in the water column, sediment, and organs of nile tilapia (*Oreochromis niloticus* Linn. 1758) at Kedung Ombo reservoir. The research was divided into three steps: preliminary survey, sampling, and analysis of samples in laboratorium. Besides, it will be also conducted the determination of physical-chemical parameters as temperature, degree of acidity (pH), alkinity, dissolved oxygen, and brightness. Data of heavy metal analysis in the fish organ were tested statiscally using one way *analysis of variance* (Anova) by using *Statistical Package For Social Science* Software (SPSS) 16.0 version. The results show that Pb levels range in the gills are 0,0028-0,0035 mg/kg; liver 0,001-0,0043 mg/kg; digestion organs 0,0008-0,0019 mg/kg; muscle 0,0009-0,0024 mg/kg; kidney 0,0041-0,0073 mg/kg; water column 0,005-0,15 mg/L; and sediment 6,36-12,33 mg/kg. The result of physical-chemical parameters still showed normal range. The range of water temperature are 29,50-30,17^{o}C; pH 7,41-7,94; dissolved oxygen 6,93-12,5 mg/L; alkalinity 86,67-280; brightness 95,17-98,67 cm; and sediment pH 5,67-6,17. Kidneys are the organs where the highest accumulation of Pb metal happened. Possibility of Pb uptake in the body of nile tilapia fish through the respiratory. Target organs impaired due to contamination of Pb into the body of nile tilapia fish by descending were kidney>gills>liver>muscle tissue>intestine.

Keywords: Lead (Pb), water column, sediment, nile tilapia fish, Kedung Ombo reservoir

Bioakumulasi Timbal (Pb) pada Lima Organ Ikan Nila (*Oreochromis niloticus* Linn. 1758) di Waduk Kedung Ombo, Jawa Tengah

Intisari

Timbal (Pb) merupakan logam yang sering ditemukan dalam industri cat, tinta, pestisida, dan fungisida. Pb dapat masuk ke badan perairan dan mengalami peningkatan konsentrasi di air. Peningkatan level Pb di dalam tubuh ikan dapat mengakibatkan efek yang berbahaya. Perpindahan logam melalui rantai makanan mengarah pada peningkatan logam dalam tubuh manusia. Penelitian ini bertujuan untuk mempelajari akumulasi Pb dalam kolum air, sedimen, dan ikan nila (*Oreochromis niloticus* Linn. 1758) di waduk Kedung Ombo. Penelitian dibagi menjadi tiga tahap: survei pendahuluan, pengambilan sampel, dan analisis sampel di laboratorium. Selain itu, juga dilakukan pengukuran parameter fisik kimiawi yaitu suhu, derajat keasaman (pH), alkalinitas, oksigen terlarut, dan kecerahan. Data hasil analisis logam berat dalam organ di masing-masing stasiun penelitian diuji statistik menggunakan *one way analysis of variance* (Anova) dengan bantuan software *Statistical Package For Social Science* Software (SPSS) versi 16.0. Hasil menunjukkan kisaran kadar Pb dalam insang 0,0028-0,0035 mg/kg; hati 0,001-0,0043 mg/kg; intestinum 0,0008-0,0019 mg/kg; otot 0,0009-0,0024 mg/kg; ginjal 0,0041-0,0073 mg/kg; kolum air 0,05-0,15 mg/L; dan sedimen 6,36-12,33 mg/kg. Hasil pengukuran parameter fisik kimiawi masih menunjukkan kisaran normal. Kisaran suhu air 29,50-30,17^{o}C; pH air 7,41-7,94; oksigen terlarut 6,93-12,5 mg/L; alkalinitas 86,67-280 mg/L; kecerahan 14,67-20,33 cm; dan pH sedimen 5,67-6,17. Ginjal merupakan organ tempat akumulasi logam Pb paling tinggi. Kemungkinan *uptake* Pb dalam tubuh ikan nila melalui jalan pernapasan. Organ target yang mengalami gangguan akibat kontaminasi Pb yang masuk ke dalam tubuh ikan nila secara menurun adalah ginjal>insang>hati>jaringan otot> intestinum.

Kata kunci : Timbal (Pb), kolum air, sedimen, ikan nila, waduk Kedung Ombo