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Original Research Article

Effects of Copper on Aquatic Plant *Lemina minor*

Zainab Kadhim Enad[1], Zahraà Qasim Khudhair[1]*, Douaa Taleb Mohammed[1], Ameer Ali Hamzah[1]
[1]Collage of Environment Science, Al-Qasim Green University, Babylon51013, Iraq

***Corresponding Author:** Zahraà Qasim Khudhair
Collage of Environment Science, Al-Qasim Green University, Babylon51013, Iraq

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Abstract: This study's goal was to determine the amount of total chlorophyll and its protein content by subjecting aquatic plants Lemina minor to different levels of Copper [10, 20, and 30 mg/L] for a month. This was done in order to assess how these salt concentrations affected the plants' physiological states. As the study came to a close, the components' quantities in the water plants used for the analysis increased differently than in the control sample, according to the investigation's findings. We looked at the protein and chlorophyll concentrations of water plants that were subjected to heavy metals.
Keywords: Copper, *Lemina Minor*, Chlorophyll and Protein Content.

INTRODUCTION

Copper is a heavy element, with a high atomic number (29) and a high density (8.92 g cm-3) [1]. Copper has wide-ranging uses in industry and agriculture, including coatings, cooking utensils, and coins. Copper compounds are used in the manufacture of pesticides and fungicides, and copper sulfate is used in the manufacture of fertilizers [2]. Copper is a micronutrient needed by living organisms, as it plays an important and primary role in the formation of chlorophyll, photosynthesis, and the formation of carbohydrates and proteins in plants [3]. The widespread use of copper leads to soil and water pollution through agricultural practices chemical fertilizers, pesticides and sewage sludge and some human activities such as construction [4]. It is found in nature in the form of sulfides and oxides, and its source is industrial waste [5]. It is found in nature in the form of sulfides and oxides, and its source is industrial waste because it is included in manufacture of alloys, wires [6]. Even though we require 1,000 micrograms of copper daily in our diet, elevated levels of ingested copper can be harmful. Elevated levels of copper for 14 days or more can lead to health problems such as permanent kidney and liver damage in infants under the age of 1 year. In adults, high levels of copper can cause digestive disorders such as nausea, vomiting, diarrhea and stomach cramps. Direct exposure to compounds Copper for long periods of time leads to poisoning because it accumulates in some parts of the body, such as the liver. Its increase in water also causes sedimentation on the fish's gills and prevents the delivery of oxygen The solute present in the water reaches it, causing an obstruction in the functioning of blood circulation, making movement fish is impossible.

The U.S. Environmental Protection Agency (EPA) has set the maximum contaminant level (MCL) for copper at 1.3 milligrams per liter (mg/L), which also may be reported as parts per million (ppm). The MCL represents the level at which the U.S. EPA believes a person can ingest a particular contaminant over an entire life span with no significant increase in health risks. The permissible limit of copper concentration is 0.05 (mg/L) in drinking water [8].

MATERIALS AND METHODS

In this experiment, 50 g of Lemina minor were weighed, and each plant was planted in ten plastic pots with 10 L of water. Each jar contains 7 L of pond water that is free of chlorine. According to the necessary test, weekly plant samples were taken from the ponds to measure the quantities of protein, chlorophyll, and heavy metals. For five weeks, growth and sampling were conducted. Additionally, the study employed three different concentrations of Copper (10, 20, and 30 mg/L) [9]. The Bradford method was used to measure the quantity of protein in aquatic plant tissues, and a chlorophyll meter was used to measure the total amount of chlorophyll [10].

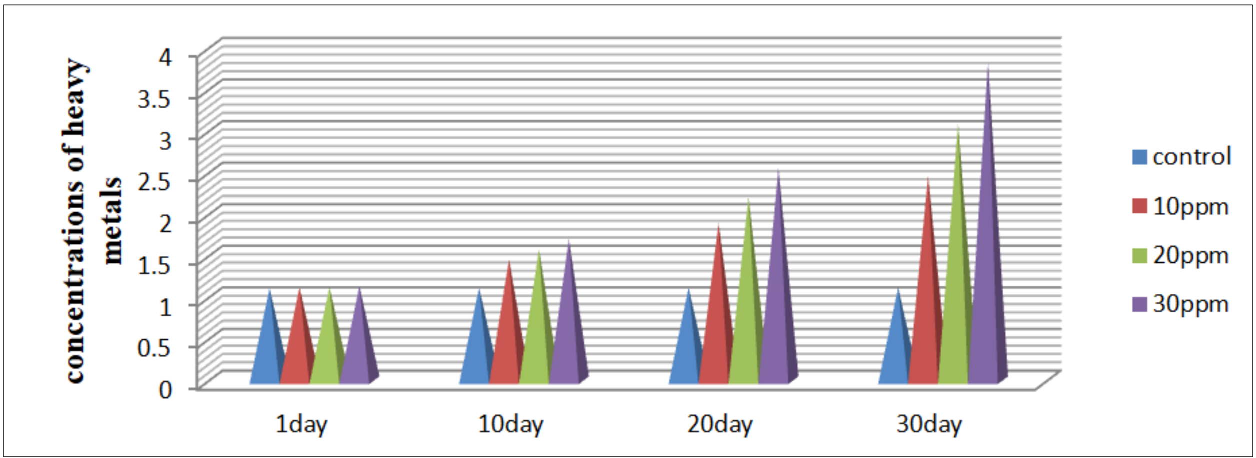

Figure 1: Three different concentrations of Copper during the experiment period in *Lemina minor* tissue

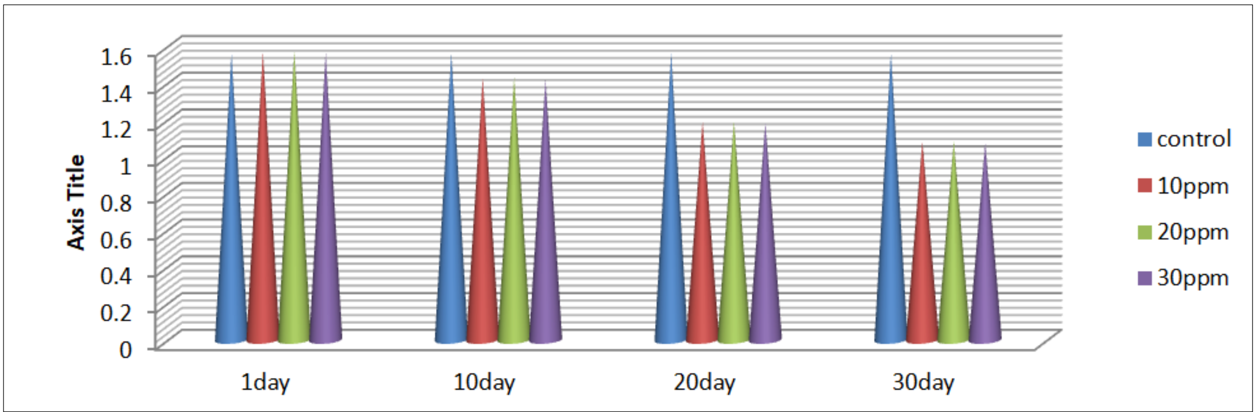

Figure 2: Effect concentrations of Copper during the experiment period on chlorophyll in *Lemina minor* tissue

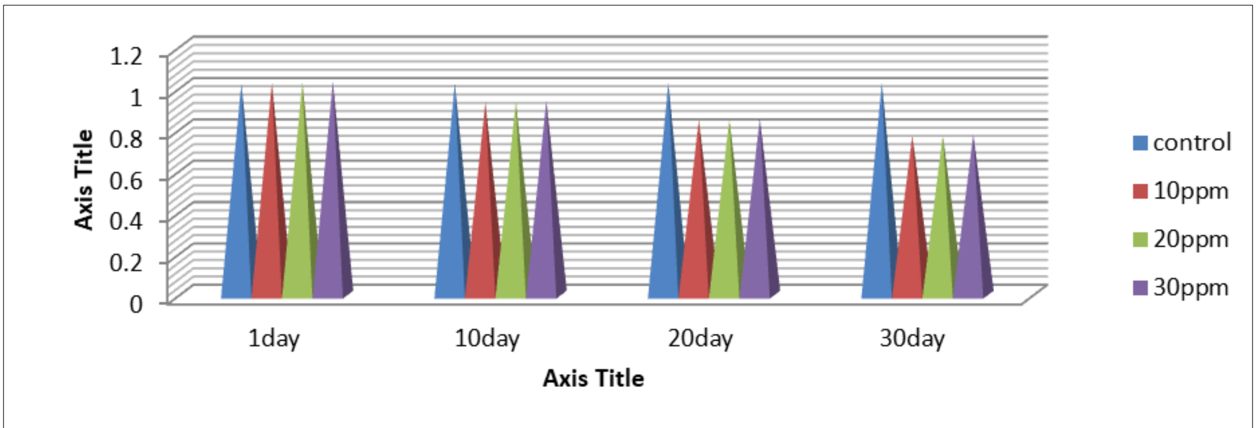

Figure 3: Effect concentrations of Copper during the experiment period on protein content in *Lemina minor* tissue

RESULTS AND DISCUSSION

According to the study's findings, the concentration of heavy metals in the aquatic plants under investigation increased towards the conclusion of the experiment. Copper buildup in the aquatic plant Lemina minor is depicted in Figure 1 in comparison to the control. This shows that the aquatic plants under study have the capacity to accumulate this element within their tissues, that they have a unique defense mechanism against high element concentrations, or that they absorb high concentrations of Copper and convert them into inactive forms of gaps [11]. Species, physiological state, and sensitivity to the element may all influence the variations in the amount of Copper stored in plant bodies [12].

Figure (2) illustrates the concentration of chlorophyll in the aquatic plant Lemina minor in comparison to the control. The study's findings indicated a decrease in the overall concentration of chlorophyll in the aquatic plant at the conclusion of the experiment. Due to the presence of these extremely poisonous chemicals, which have the ability to build up in plant tissue, the quantities of chlorophyll in the experimental plants have decreased [13].

The figure (3) displayed The reason for the decline in the protein content of Lemina minor plants is that the protein content in their tissues is consumed during essential functions or metabolic processes that occur within them to withstand the concentration of Copper, which lowers the percentage of protein content in their tissues [14]. Until End of Experience is reached, this percentage falls as exposure time increases [15].

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