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Original Research Article

Lead and Cadmium Chloride's Effects on the Physiological State of Schoenoplectus Litoralis and Myriophyllum Verticillatum

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Abstract: The purposes of the study were to assess the levels of total chlorophyll and protein content, as well as to determine the adverse impacts of different lead and cadmium chloride concentrations (10, 20, and 30 mg/L) on the physiological characteristics of Schoenoplectus litoralis and Myriophyllum verticillatum. The results of the study showed that the component concentrations in the water plants under investigation were higher at the end of the investigation when compared to the control sample, in addition to a decrease in the amounts of protein and chlorophyll in the water plants exposed to the effects of heavy metals.

Keywords: Cadmium Chloride, and Lead Chloride Myriophyllum V, Schoenoplectus L, Protein and Chlorophyll.

INTRODUCTION

Aquatic plants have an essential role in the aquatic ecology, which causes them particularly important in the fight against heavy metal pollution, which poses a major threat to the environment. Using plants in treatment is a novel way to remove pollutants since some plants have genetic, chemical, and physiological properties that do not harm the environment, unlike chemicals, which are detrimental to the environment when used to treat contaminated water [1]. Some plant families have been utilized as biological evidence for researching water pollution with heavy metals because of the variety of aquatic vegetation, their wide distribution in water bodies, and their good tolerance to changing environmental conditions [2]. Because of their propensity to extract heavy elements from water and accumulate them in tissues, they have also found widespread application in the bio-filtration industry. Phytoremediation is the technique of employing plants to remove contaminants from wastewater, surface water, groundwater, and soil because plants' biological processes utility in the process of Phytoremediation [3]. Numerous of these plants provide conclusive evidence of heavy element pollution in water because they have a greater capacity to store heavy elements in their tissues than in the aquatic environment, In addition to their rapid growth and low environmental requirement for adaptation to a wide range of habitats [4]. Different amounts of heavy metals can accumulate in different plant bodies, depending on the species of the plant and the organ under investigation [5]. In natural systems, elements are absorbed by plants more slowly and as dissolved complexes, which are contingent upon the chemical and physical parameters of their immediate surroundings [6]. This has a significant impact on procedures pertaining to element ion absorption, Due to interference in the ion transport system between the two types of elements brought on by similarities in the chemical properties of minerals, some plants accumulate high concentrations of both essential and non-essential elements in their tissues, rendering the plant unable to discriminate between the two types of elements [7]. Since these plants can extract elements from the substrate at far higher rates than normal plants, they are referred to as hyper-accumulators, to become resistant to high element concentrations, these plants bind to peptides called phyto-chelatin, which have the (-SH) group [8]. The purpose of this study was to look at how lead and cadmium chlorides affected the physiological traits and growth of Schoenoplectus litoralis and Myriophyllum verticillatum.

MATERIALS AND METHODS

The purpose of the research was to determine if water plants such as Myriophyllum verticillatum and Schoenoplectus litoralis could remove specific heavy metals. 500 grams was assigned to each plant, and they were cultivated individually in 15-liter plastic containers. Each container held ten liters of water contaminated with cadmium chloride and lead chloride at three different concentrations (10, 20, and 30 mg/liter) [9]. Samples were taken every ten days during the course of the study, which lasted a month in accordance with the necessary test. To estimate the levels of protein and chlorophyll, as well as the quantities of heavy metals, plant samples were taken from the ponds. Methods [10, 11], were used to assess the total chlorophyll content in aquatic plant tissues and to measure the protein level in plant tissues, respectively.

RESULTS & DISCUSSION

The results of the study showed an increase in the concentration of heavy elements in the studied aquatic plants at the end of the experiment. Figure (1) shown accumulation of cadmium chloride and lead chloride (5.361 and 5.459) compared with the control (5.191 and 5.304) respectively in the aquatic plant ***Myriophyllum Canadensis*** tissues where concentrations of cadmium chloride and lead chloride in the aquatic plant ***Schoenoplectus litoralis*** tissues (5.154 and 5.128) compared with the control (4.122 and 4.632) respectively. In other words, the aquatic plant Schoenoplectus litoralis has a higher lead chloride accumulation than the aquatic plant Myriophyllum Canadensis, but the aquatic plant Myriophyllum Canadensis has a higher accumulation of cadmium chloride in its tissues [12, 13].

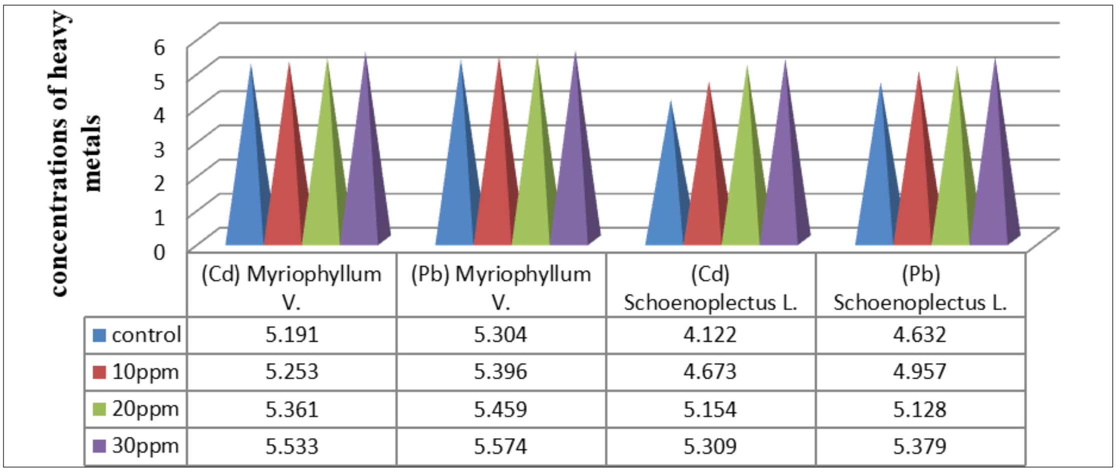


Figure 1: Concentrations of cadmium chloride and lead chloride in *Myriophyllum verticillatum and Schoenoplectus litoralis* tissues

The results of the study showed a decrease in the total concentration of chlorophyll in the studied aquatic plants at the end of the experiment, figure (2) shown the concentration of chlorophyll in the aquatic plants ***Myriophyllum Canadensis*** in concentration 30 ppm of cadmium chloride and lead chloride (1.498 and 1.532) compared with the control (1.816 and 1.857) respectively where concentrations of cadmium chloride and lead chloride in the aquatic plant ***Schoenoplectus litoralis*** tissues (1.289 and 1.458) compared with the control (1.443 and 1.622) respectively.

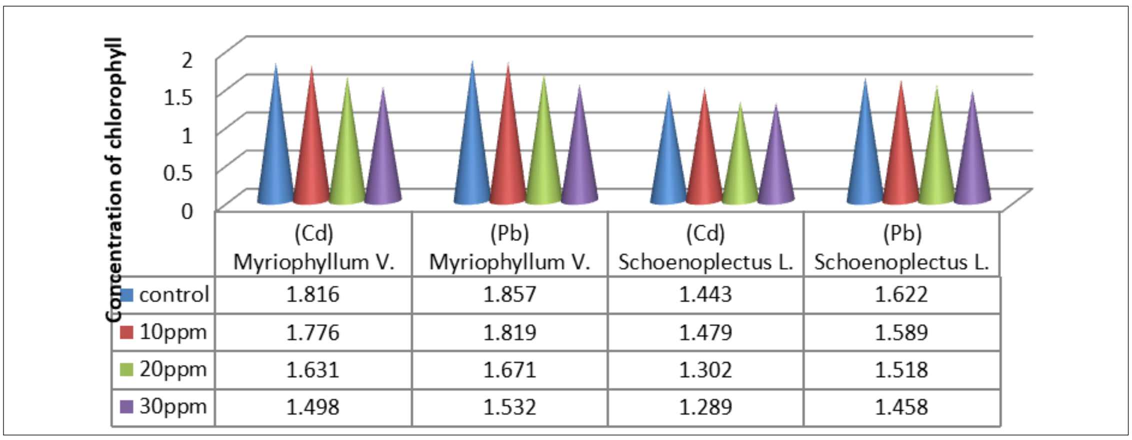
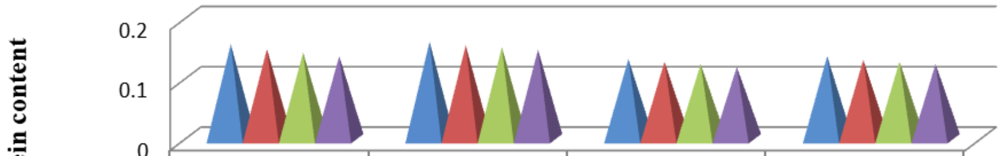


Figure 2: Concentration of chlorophyll in *Myriophyllum verticillatum and Schoenoplectus litoralis* tissues

Figure (3) shown the protein content in the aquatic plants ***Schoenoplectus litoralis*** in concentration 30 ppm of cadmium chloride and lead chloride (0.137 and 0.148) compared with the control (0.157 and 0.161) respectively in the aquatic plant ***Myriophyllum Canadensis*** tissues where concentrations of cadmium chloride and lead chloride in the aquatic plant ***Schoenoplectus litoralis*** tissues (0.119 and 0.124) compared with the control (0.132 and 0.137) respectively.



	(Cd) Myriophyllum V.	(Pb) Myriophyllum V.	(Cd) Schoenoplectus L.	(Pb) Schoenoplectus L.
control	0.157	0.161	0.132	0.137
10ppm	0.149	0.155	0.128	0.131
20ppm	0.143	0.152	0.124	0.128
30ppm	0.137	0.148	0.119	0.124

Figure 3: Protein content in *Myriophyllum verticillatum and Schoenoplectus litoralis* tissues

Conclusion and Recommendations

The tissues of the aquatic plant Myriophyllum Canadensis show a higher build-up of lead and cadmium chloride than those of Schoenoplectus litoralis. Protein and chlorophyll levels were most markedly reduced in Schoenoplectus litoralis and Myriophyllum verticillatum due to metal buildup.

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