



REMOVAL OF CADMIUM AND LEAD BY *TYPHA LATIFOLIA* EXPOSED TO HIGH METAL SOLUTIONS

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Introduction. As a result of the industrialization and the increase in world population, the concentration of toxic elements in water, air and soil has increased. Among these pollutants, lead (Pb) and cadmium (Cd) are elements that cause adverse effects to humans and the environment (1). Thus, it is necessary to propose effective strategies for the remediation of sites impacted by mixtures of heavy metals. The aquatic macrophyte *T. latifolia* presents rapid growth, easy spreading, high-pollutant uptake capacity and easy harvesting, properties required for aquatic plant used in treatment system (2). The aim of this study was to evaluate the capacity of *Thypha latifolia* to remove and accumulate high concentrations of heavy metals (Pb and Cd).

Methods. *Typha latifolia* plants were carefully washed using tap water followed by deionized water, and finally rinsed by immersion in a 0.01 M EDTA to remove any adsorbed metals. Plant material was dried at 70°C during 12 h and then grounded in a Wiley mill for 2 min. Analyses of Pb and Cd were carried out by acid digestion with HNO₃ and H₂O₂ 30% (v/v) (3, 4). The contents of Pb and Cd in plant material and solution were determined by an atomic absorption spectrophotometer (AAS) using an air-acetylene flame (Varian-SpectrAA). Total chlorophyll was determined according to the method proposed by Arnon (1949).

Results. Table 1 shows the total chlorophyll content of *T. latifolia* exposed for 10 days to single metal (Cd or Pb). Plants exposed to Pb and Cd decreased significantly ($p \leq 0.05$) their chlorophyll content compared to the unexposed plants (Table 1). In addition, symptoms of toxicity such as chlorosis on the leaves and browning color, occurred mainly in plants exposed to 15 ppm Pb and 85 ppm Cd. Toxic elements such as Pb and Cd produce chlorosis by the decrease in the ATPase activity in the plasmatic membrane and by the inhibition of the chlorophyll synthesis (5).

Figure 2 shows the amount of Pb and Cd removed from the solution by *T. latifolia*. The concentration of elements gradually decreased in the solution as the exposure time increased. The maximum removal was showed as follows at 10 days of the experiment.

Table 1. Phytotoxic effects in *T. latifolia* exposed for 10 days to single metal (Cd or Pb).

Concentration	Initial total chlorophyll content (mg/g)	Total chlorophyll content (mg/g)
Pb	0 ppm	1.02
	5 ppm	0.92
	10 ppm	1.53
	15 ppm	0.68
Cd	0 ppm	1.57
	20 ppm	1.12
	40 ppm	0.84
	85 ppm	0.79

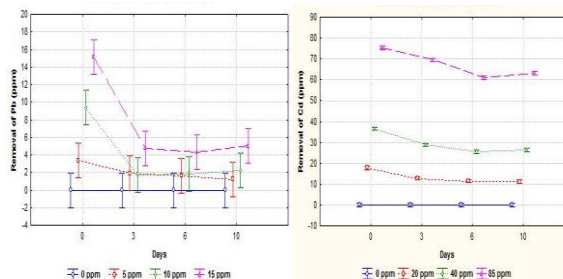


Fig.1 Removal of Pb and Cd by *Typha latifolia* from single elements solutions.

Conclusions. *T. latifolia* removed effectively Pb>Cd. The findings suggest that *T. latifolia* has a potential for the treatment of polluted waters containing these elements.

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