



## Evaluation of the autochthonous free-floating macrophyte *Salvinia biloba* Raddi for use in the phytoremediation of water contaminated with lead

Wilfredo Tello Zevallos<sup>a</sup>, Lucas Matías Salvatierra<sup>a,b</sup>, Dana Belén Loureiro<sup>a,d</sup>, Jordi Morató<sup>c</sup>, Leonardo Martín Pérez<sup>a,c,d,\*</sup>

<sup>a</sup>Facultad de Química e Ingeniería del Rosario, Pontificia Universidad Católica Argentina (UCA-campus Rosario), Av. Pellegrini 3314 (2000) Rosario, Argentina, email: [tellowz@gmail.com](mailto:tellowz@gmail.com) (W. Tello Zevallos), [lucas\\_salvatierra@uca.edu.ar](mailto:lucas_salvatierra@uca.edu.ar) (L.M. Salvatierra), [danaloureiro@uca.edu.ar](mailto:danaloureiro@uca.edu.ar) (D.B. Loureiro), Tel. +54-341-4350214/int.135, email: [leonardoperez@uca.edu.ar](mailto:leonardoperez@uca.edu.ar) (L. M. Pérez)

<sup>b</sup>Instituto de Físicoquímica Teórica y Aplicada (INIFTA, Universidad Nacional de La Plata-Consejo Nacional de Investigaciones Científicas y Técnicas), Diag. 113 y 64 (1900) La Plata, Argentina

<sup>c</sup>Cátedra UNESCO de Sostenibilidad, Universidad Politécnica de Catalunya, ESEIAAT- Campus Terrassa, C/Colom 1 (08222) Terrassa (Barcelona), España, email: [jordi.morato@upc.edu](mailto:jordi.morato@upc.edu) (J. Morató)

<sup>d</sup>Facultad de Ciencias Bioquímicas y Farmacéuticas, Universidad Nacional de Rosario (UNR) Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Suipacha 570 (2000) Rosario, Argentina

Received 11 August 2017; Accepted 19 November 2017

### ABSTRACT

Plant-based systems for the treatment of contaminated environments (phytoremediation) have been proved to be highly efficient in removing pollutants, especially heavy metals. However, in strictly aquatic and high-flow treatment systems, the use of free floating plants could be more adequate. For a treatment system based on phytoremediation strategies to be feasible and sustainable, it is essential that the plants used are not only efficient in pollutants removal, but also abundant in the region, easily accessible, and do not require special culture conditions. In this work, we evaluate the capacity of four different autochthonous macrophytes obtained from the Paraná river (Argentina) to adapt and reproduce without any additional nutrient supply or temperature special conditions (laboratory «indoor» environment). Only those specimens that doubled their biomass in a two-week period without any visual signs of deterioration (loss of turgor, chlorosis and/or necrosis of leaves) were considered for further analysis. From different pre-selected species, only *Salvinia biloba* Raddi showed a wide capacity to adapt and reproduce under these conditions. Moreover, the ability to remove lead (Pb<sup>2+</sup>) by *S. biloba* was evaluated in water samples contaminated with three metal concentrations (4.8 ± 0.3, 9.1 ± 0.4 and 19.6 ± 0.5 mg/L) at different exposure times (0–24 h), showing a high efficiency in the pollutant elimination. A compartmentalization analysis indicates that surface adsorption was the predominant mechanism for Pb<sup>2+</sup> removal at the first 24 h. Finally, the bioconcentration factor (BCF) was calculated at the end of the exposure time, reflecting both hyperaccumulation capacity and high metal tolerance by this plant. Our results suggest that incorporation of *S. biloba* in wastewater treatment systems could be a successful strategy to efficiently remove heavy metals by bioremediation processes.

**Keywords:** Heavy metals; Industrial wastewater; Lead; Phytoremediation; *Salvinia biloba* Raddi

\*Corresponding author.

Presented at the International Conference on Water and Sustainability, 26-27 June 2017, Barcelona, Spain