

Removal of Lead from Synthetic Wastewater using Aquatic Plants

Jaruwan Wongthanate*, Ngamnij Anusasnee, Benjaphorn Prapagdee and
Acharaporn Kumsopa

Abstract

Abilities of aquatic plant species, *Echinodosus cordifolius* (L.) Griseb., *Bacopa caroliniana* (Walt.) Rob., and *Hydrocotyle umbellata* L., for phytoremediation of lead (Pb) from synthetic wastewater were conducted in hydroponic system at 20-80 mg/L of Pb (II) and 7-28 days of exposure periods. Additional experimental set up for aquatic plant species under 60 and 80 mg/L of Pb (II) were added with 5 mM EDTA in order to enhance Pb accumulation in the plants. Results revealed that the capacity of Pb (II) accumulation at 80 mg/L of Pb (II), 28 days in roots of all aquatic plants was higher than that of shoots. *E. cordifolius* (L.) Griseb. had the highest capacity of Pb (II) accumulation about 12,566 (roots) and 8,686 (shoots) mg/kg dry wt, respectively giving 95% of Pb (II) removal, followed by *H. umbellata* L. and *B. caroliniana* (Walt.) Rob., respectively. Regarding EDTA addition, lead accumulation (80 mg/L of Pb (II), 7 days) was increased in the roots of *H. umbellata* L. about 19,883 mg/kg dry wt and it was increased in the shoots of *E. cordifolius* (L.) Griseb. about 14,516 mg/kg dry wt (80 mg/L of Pb (II), 21 days), respectively. The highest relative growth (13.85) and percentage of biomass productivity (98%) were in *H. umbellata* L. (60 mg/L of Pb (II), 7 days), whereas the highest bioconcentration factor (9,341.68) was in *E. cordifolius* (L.) Griseb. (80 mg/L of Pb (II), 21 days). According to the results, *E. cordifolius* (L.) Griseb. was recommended to remove the lead from synthetic wastewater with EDTA addition. Further studies in contaminated wastewater under various characteristics and flows should be investigated.

Keywords : *Echinodosus cordifolius* (L.) Griseb., *Bacopa caroliniana* (Walt.) Rob., *Hydrocotyle umbellata* L., Lead, EDTA, Wastewater

Faculty of Environment and Resource Studies, Mahidol University, 999 Phutthamonthon 4 Road, Salaya, Phutthamonthon, Nakhon Pathom, Thailand.

* Corresponding author, E-mail: jaruwan.won@mahidol.ac.th Received 2 May 2014, Accepted 4 September 2014