

The potential of selected macroalgal species for treatment of AMD at different pH ranges in temperate regions

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Abstract

The metal bioaccumulation potential of selected macroalgae species at different pH ranges was studied for usage as part of a possible secondary passive acid mine drainage (AMD) treatment technology in algae ponds. Two separate studies were conducted to determine the suitability of macroalgae for passive treatment when metabolic processes in macrophytes and microorganisms in constructed wetlands decrease during winter months. In the field study, the bioconcentration of metals (mg/kg dry weight) measured in the benthic macroalgal mats was in the following order: site 1. *Oedogonium crassum* Al > Fe > Mn > Zn; site 2. *Klebsormidium klebsii*, Al > Fe > Mn > Zn; site 3. *Microspora tumidula*, Fe > Al > Mn > Zn and site 4. *M. tumidula*, Fe > Mn > Al > Zn. In the laboratory study, cultured macroalgae *K. klebsii*, *O. crassum* and *M. tumidula* isolated from the field sampling sites were exposed to three different pH values (3, 5 and 7), while bioaccumulation of the metals, Al, Fe, Mn and Zn and glutathione S-transferase (GST) activity were measured in the different selected algae species at a constant water temperature of 14 °C. Bioaccumulation of Al was the highest for *O. crassum* followed by *K. klebsii* and *M. tumidula* ($p < 0.0001$). From the study it was evident that the highest metal bioaccumulation occurred in the macroalgae *O. crassum* at all three tested pH values under constant low water temperature.