Potential of native free floating *Salvinia biloba* macrophytes for removing atrazine and carbendazim from aqueous solution

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Abstract

The potential of autochthonous free-floating *Salvinia biloba* specimens was assessed in order to select native plants for use in remediation of atrazine and carbendazim polluted waters. Experiments were carried out over 20 days (23 ± 2 °C, 100 l m/W light intensity, 12 h photo-period) in glass vessels containing deionized water contaminated with 0; 5.0; 10.0 and 20.0 mg L-1 of atrazine or carbendazim. A decrease in biomass growth was observed in all macrophytes exposed to the pesticides. Atrazine showed higher toxic effects evidenced by the symptomatology developed by the plants, demonstrating the high sensitivity of *S. biloba* to this herbicide. Noticeably, lower chlorosis and necrosis were observed in *S. biloba* specimens treated with carbendazim, even at the higher concentration tested. In general, *S. biloba* presented a low potential for both atrazine and carbendazim removal. In addition, the percentage of pesticides removed from the solution decreased when the plants were exposed to higher concentrations of the pollutants. This fact probably resulted from the processes of pesticide adsorption by plant biomass. The FTIR-ATR spectrum obtained for *S. biloba* showed the presence of different functional groups (e.g., carboxyl, phosphate, amide, hydroxyl, sulphate) on the plant surface that could be involved in pesticide biosorption through π-π interactions, hydrogen bonding, acid-base behavior, ion-exchange properties, and electrostatic attractions. In conclusion, *S. biloba* was not much effective in removing atrazine and carbendazim from water samples. Therefore, the use of these native macrophytes to remediate aquatic environments contaminated with these pesticides seems to be limited.

Keywords: Atrazine, carbendazim, Salvinia biloba, phytoremediation, biosorption.