

## Evaluation of three fungal strains for biological removal of Carbamazepine and Atrazine

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### Extended Abstract

The fate of organic contaminants (OCs) in natural water is not well covered by the world-wide regulation community. The inefficiency of conventional wastewater treatment plants (WWTPs) to remove recalcitrant compounds results in a continuous release of biologically active molecules into the environment. Consequently, new techniques such as biological processes and bioremediation approach by using white rot fungi (WRF) is becoming more popular.

In this study, two recalcitrant model OCs, carbamazepine (CBZ) and atrazine (ATZ) and three different WRF strains (*Trametes hirsuta*, *Corioloopsis polyzona*, and *Pleurotus dryinus*) were selected for the removal of these OCs at three different environmental concentrations. Experimental set up were performed with single and mixed solution of CBZ and ATZ at 100, 150 and 200  $\mu\text{g l}^{-1}$ . The sorption mechanisms were evaluated using biocided fungi. The removal of OCs and extracellular enzyme activity (laccase) were quantified by mass spectrometry and UV spectroscopy respectively.

The result showed that the removal efficiency of ATZ and CBZ were up to 85% even in the presence of biocides, that suggests the high contribution of the membrane biosorption of the WRF on ATZ and CBZ removal from aqueous solutions. The extracellular enzyme activities (i.e. LAC) were not detected in two of the tested fungal stains (ie. *C. polyzona* and *P. dryinus*) but with *T. hirsuata* laccase activity raised up to maximal 600 U/l after 4 days of cultivation with CBZ (100  $\mu\text{g l}^{-1}$ ) and 800 U/l for ATZ (150  $\mu\text{g l}^{-1}$ ) after 3 days in the single sets experiments. In binary mixed set (150  $\mu\text{g l}^{-1}$ ), *T. hirsuata* laccase activity reached a maximal level of 900 U/l after 5 days. ATZ was removed at up to 100% during the first 24h for three WRF studied stains. Interestingly, the ATZ concentration in solution increased after 24h with *T. hirsuata* suggesting a passive uptake and extracellular release, while the living and biocided fungi had the same behaviour. Also, the removal efficiency of CBZ at three environmental concentrations was up to 100% on the first 24h without any fluctuation in the removal rate over a 5 day incubation period.

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