Bioaugmented Constructed Wetlands for Contaminant and ARGs Removal

Description

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Partially saturated vertical surface flow constructed wetland for emerging contaminants and antibiotic resistance genes removal from wastewater: The effect of bioaugmentation with *Trichoderma*

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his research, developed as part of the **PRIMA-SAFE** project and published in *Journal of Environmental Chemical Engineering*, investigates the use of **constructed wetlands**, enhanced with *Trichoderma asperellum*, for the removal of contaminants and antibiotic resistance genes (ARGs) from treated wastewater.

Key Findings

- Bioaugmentation with *Trichoderma* successfully enhanced the growth of the fungus in competitive conditions and increased the removal efficiency (RE) of selected CECs—especially **diclofenac and benzotriazole**, which saw a RE improvement of more than **10%**.
- Of the 22 compounds with high RE (>65%), **17 had log Dow values between 0 and 3**, an optimal range for plant uptake.
- **Highly polar compounds** (log Dow < 0), such as melamine, were poorly removed.
- The wetlands generated multiple **transformation products (TPs)**, including N-oxides and hydroxylated compounds, some of which were persistent.
- No significant differences in **ARGs abundance** were observed across treatments, though bioaugmentation influenced the **composition and turnover** of ARGs communities.

Implications

This pilot-scale study provides valuable insights into the complexity of contaminant and ARGs removal in CWs and the **limited but selective advantages** of fungal bioaugmentation. It supports the integration of **nature-based solutions** with **biological enhancements** to address emerging pollutants in treated wastewater, especially in contexts of reuse for agriculture.

Reference

Tadi? ?., Sauvêtre A., Cerqueira F., Lestremau F., Ait-Mouheb N., Chiron S. (2024).
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