Increasing ibuprofen degradation in constructed wetlands by bioaugmentation with gravel containing biofilms of an ibuprofen-degrading Sphingobium yanoikuyae

Eduardo Marcos Baciunas¹, Uwe Kappelmeyer¹, Hauke Harms², Hermann J. Heipieper¹
¹Department of Environmental Biotechnology, Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany
²Department of Environmental Microbiology, Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany

Abstract:
The aim of this study was to investigate the removal of ibuprofen in laboratory scale constructed wetlands. Four (planted and unplanted) laboratory-scale horizontal sub-surface flow constructed wetlands were supplemented with ibuprofen in order to elucidate (i) the role of plants on ibuprofen removal and (ii) to evaluate the removal performance of a bioaugmented lab scale wetland. The planted systems showed higher ibuprofen removal efficiency than an unplanted one. The system planted with Juncus effusus was found to have a higher removal rate than the system planted with Phalaris arundinacea. The highest removal rate of ibuprofen was found after inoculation of gravel previously loaded with a newly isolated ibuprofen-degrading bacterium identified as Sphingobium yanoikuyae. This experiment showed more than 80 days of CW community adaptation for ibuprofen treatment could be superseded by bioaugmentation with this bacterial isolate.

Keywords: constructed wetlands, ibuprofen, Juncus effusus, Phalaris arundinacea, Sphingobium yanoikuyae