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BIOTREATMENT OF DRINKING WATER RESOURCES POLLUTED BY PESTICIDES, PHARMACEUTICALS AND OTHER MICROPOLLUTANTS (BIOTREAT)

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Abstract

BIOTREAT is a new EU project initiated 1st January 2011 aiming at developing new technologies for bioremediation of drinking water resources contaminated with micropollutants such as pesticides and pharmaceuticals. Micropollutants are organic pollutants that occur in contaminated water at extremely low concentrations ranging from 0.1 to10 µg/l, but still above the EU limit values. The basis of the proposed technologies is bioaugmentation, which in the present context is the introduction of specific degrading microorganisms or microbial consortia into existing sand filters at waterworks, mobile biofilters placed close to groundwater abstraction wells, sand barriers between surface waters and abstraction wells, and subterranean protective barriers established to prevent micropollutants from entering into aquifers.

BIOTREAT brings together six research institutions and four SMEs to develop much-needed water treatment biotechnologies. These biotechnologies will be developed into prototype biofilter systems ready for subsequent commercialisation. The biofilters will contain non-pathogenic pollutant-degrading bacteria, with the bacteria being immobilised on specific carriers to ensure their prolonged survival and sustained degradative activity. Two complementary biotreatment strategies will be followed, one based on metabolic processes whereby the bacteria completely mineralise specific micropollutants and the other based on cometabolic degradation utilising the ability of methane- and ammonium-oxidising bacteria to unspecifically degrade a range of micropollutants for which specific degraders are not yet available. The biofilter systems will be carefully validated through cost-benefit analysis and environmental life cycle assessment. In addition to bringing considerable advances to water treatment biotechnology, the main outcome of BIOTREAT will thus be prototype biofilter systems (metabolic and cometabolic) ready for commercialisation in a number of highly relevant water treatment scenarios.

As an example of research carried out until know sand columns have been established in the laboratory mimicking the conditions of sand filters at waterworks. The columns were packed with quarts sand and added a culture of *Aminobacter* strain MSH1. This strain has previously been shown to mineralise the pesticide residue 2.6-dichlorobenzamide (BAM) even at µg/l concentrations. The columns were placed at 10 °C and fed BAM (2 µg/l) polluted drinking water. Preliminary results showed 65% reduction of the BAM concentration at a hydraulic retention time of 20 minutes only. These results demonstrate that *Aminobacter* sp. MSH1 is a promising candidate for use in bioremediation processes aimed at cleaning natural waters polluted with BAM at the low concentrations typically found in groundwater.

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