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Biodegradation kinetics of organic micropollutants in planted or unplanted columns simulating an innovative reed bed filter treating runoff water.

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Road runoff water is known for its contamination with metallic and organic compounds. This water can contribute to the degradation of receiving aquatic environments if they are discharged without treatment. Therefore, to limit this effect into the Seine River, the Paris municipality (France) has set up a reed bed filter (RBF) for road runoff treatment as a part of the European Life Adsorb project. This RBF is separated in two parts with a slightly different substrate composition, one only with sand and the other one with sand and a commercial adsorbent (CA). The main objectives of the project are to monitor the evolution of the RBF efficiency and understand the fate of contaminants within RBF, which requires the study of their degradation. Thus, this work will present results of biodegradation trials of three emerging organic micropollutants, bisphenol-A (BPA), and two alkylphenols, 4-nonylphenol and 4-t-octylphenol (4-NP, 4-OP) in planted (*Phragmites australis*) and unplanted columns simulating the functioning of the RBF. Importance of sand, CA and sediment (top of the filter) are studied separately. Specific attention was paid to the role of autochthonous bacterial communities of substrates and to the proper modeling of kinetics. Results showed: (i) microorganisms activities were the major degradation factor of all pollutants for all substrates, as 68.0 to 92.5 % of total percentage degradation (all kinetics considered) was due to biotic degradation; (ii) *P.australis* played a role in biodegradation by increasing the final percentage of degradation at the end of kinetics, for the example of BPA, 3.9% versus 0.4% remained in the sand and 14.2% versus 1% remained in CA, depending on the unplanted or planted conditions respectively; (iii) with BPA half-lives (DT50) between 2.34-4.06 days for sand and CA and 21.7 d in sediment, compared to 2.55-15.63 d and 4.83-13.63 d for 4-NP and 4-OP respectively in all substrates, BPA was the most rapidly degraded compound except for sediment, (iiii) Although structure of bacterial communities were different in the three substrates (beta-diversity, p-values < 0.001), they were able to significantly degrade all pollutants and few change in their structure was observed during 30 days of experiment.