

Design of a large scale outdoor mesocosm to investigate heavy metals and polycyclic aromatic hydrocarbons phyto- and bio-remediation

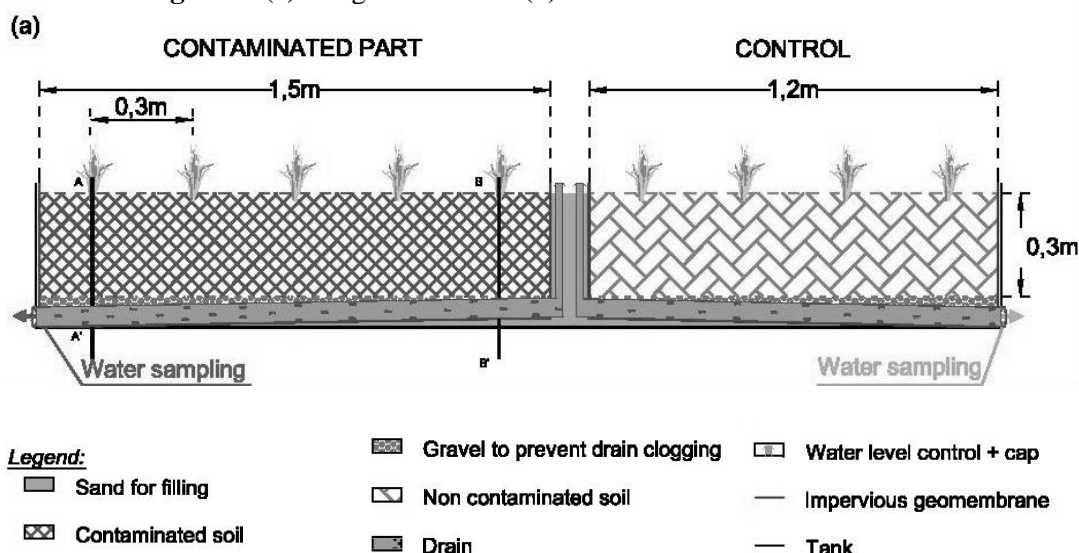
Leroy, M.-C. ^{*1,2}; Peruisset G.¹; Koltalo F.²; Le Derf F.²; Marcotte S.³; Legras M.⁴

¹ INFRA Services ; ² COBRA UMR 6014, Université de Rouen-IUT d'Evreux ; ³ COBRA UMR 6014, INSA - Institut National des Sciences Appliquées de Rouen ; ⁴ Laboratoire Biosol, Esitpa- Ecole d'ingénieurs en agriculture, Unité Agri'Terr.

*mleroy@esitpa.org

Infiltration technics to catch highway and urban run-off are more and more used¹. Thereby, it is a real concern to understand the fate of pollutants in water, soil, and plants in planted trenches dedicated to infiltration to prevent groundwater contamination.¹ To access to the system behaviour under natural conditions better than microcosm experiment offers to, we designed a large-scale outdoor mesocosm experiment. A 2.7 meters-long tank, was divided in two parts: the control (not contaminated) part and the contaminated part spiked according to the method described in Zhang *et al.*² with Cd, Pb, and Zn (at 2, 100 and 300 mg.kg⁻¹, respectively) along with phenanthrene, pyrene, and benzo[a]pyrene (at 10 mg.kg⁻¹ each). A drain with a diameter of 60 mm was placed at the bottom of the tank to collect infiltrated water (Figure 1). Three similar tanks were built and each was planted with one different species to reach a density of 11,1 plants/m². The setting allows the determination of soil, microorganisms, and plants (*i.e.* rhizosphere) contribution to the retention and degradation of heavy metals and Polycyclic Aromatic Hydrocarbons. After two weeks of equilibration, soil quality remains preserved and the contamination seemed to be homogeneous along the mesocosm. Microbial abundance and diversity investigations are in progress.

Figure 1. (a) Longitudinal- and (b) cross-sections of the mesocosm.



¹ Debecdelièvre, L.; Barraud, S.; Clozel, B.; Gaboriau, H.; Seron, A.; Come, J.-M.; Kaskassian, S.; Verjat, J.-L.; Bedell, J.-P.; Delolme, C.; Perrodin, Y.; Winiarski, T.; BreLOT, E.; Bacot, L.; Soares, I.; Desjardin-Blanc, V.; Lipeme-Kouyi, G.; Malard, F.; Mermillod-Blondin, F.; Gibert, J.; Marmonier, P.; Herbreteau, B. (2009). L'infiltration en questions. Recommandations pour la faisabilité, la conception et la gestion des ouvrages d'infiltration des eaux pluviales en milieu urbain. Programme ECOPLUIES, pp. 63.

² Zhang, Z.; Rengel, Z.; Meney, K.; Pantelic, L.; Tomanovic, R. (2011). Polynuclear aromatic hydrocarbons (PAHs) mediate cadmium toxicity to an emergent wetland species. *Journal of Hazardous Materials*, 189(1-2), 119-126.