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Short-term assessment of the effect of phytostabilizing plants and management methods on the biodiversity and the mobility of trace elements in an urban wasteland in the Région Ile-de-France, France

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Current urban development guidelines favour renewal and densification of cities, emphasizing the necessity to redevelop urban wastelands. However, many such sites are polluted with heavy metals and metalloids (TE), radionuclides, hydrocarbons. As a result, wasteland reconversion implies initial soil decontamination. The cost of servicing, depolluting and decontaminating these wastelands, using conventional soil depollution techniques is exorbitant. Thus, phytotechnology techniques offer an alternative that is more in line with sustainable development issues (Bert et al. 2012). Although the latter have been extensively studied for more than 30 years, they are still emerging on the market for the treatment of polluted sites. In addition, they raise many unanswered questions on the mobility, bioavailability and transfer of pollutants between the different compartments (soil/water/plants/microflora/fauna) over a relatively long periods of time (more than 10 years). Also, maintenance and management practices on site during the process of depollution still are problematic, particularly the downstream usage of contaminated plant biomass.

Through the OBSOLU project (Urban Observatory for the Study of Anthropogenic Soils), the Val-de-Marne Departmental Council (CD94) wishes to evaluate new experimental approaches for the rehabilitation of an urban wasteland affected by multi-metallic pollution (La Pierre-Fitte site, Villeneuve-le-Roi, Val-de-Marne, France). The evaluation of the dynamics of metallic trace elements (TE) in the soil-water-plant-fauna continuum is carried out on four vegetated plots (planted either with native or introduced phytostabilizing plant species (*Agrostis capillaris, Festuca arundinacea, Lolium perenne*)) managed according to two different methods (harvested plant biomass either left in place or exported for composting). The objective is to assess over several years, the mobility of TE in the soil and their infiltration to the water table, in relation with 1) the presence of native or phytostabilizing plants, mycorrhizal or not, 2) of the type of management of the harvested plant biomass and 3) the biodiversity indices at the experimental sites. Initial TE analyses revealed the presence of lead, zinc, copper and nickel in high concentrations, distributed heterogeneously over the entire experimental site. Interestingly, one year into the experiment, this high level of pollution with TE does not seem to affect the plant and arthropod populations that show good biodiversity indices, compared to other polluted sites in Ile-

de-France. All introduced phytostabilizing plant species surveyed were found to be mycorrhizal and phytostabilizing for lead, nickel and to a lesser extent copper. So did certain native species, such as *Solidago canadensis*. Only zinc, an acknowledged mobile element, does not seem to be stabilized in the rhizosphere of the plants, either native or introduced. At this point in this five-year long experiment, a detailed analysis of the initial characteristics of the site has been established. The preliminary results indicate that phytostabilization could be limit TE dispersal in the environment, a conclusion that will be reassessed over the years.

Key word : metallic trace elements - phytostabilisation - urban wasteland - rehabilitation