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Functional profiles of soil microbial populations in a urban context: land use vs geology.

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Abstract (max. 400 words)

Terrestrial urban ecosystems form an assemblage of landscapes composed of a set of natural and anthropogenic parcels at different exploitation stages (gardens, forests, parks, prairies, fallows… but also roads, parking lots, buildings …) characterised by several levels of structural complexity in terms of biodiversity. The city is therefore seen as a mosaic of (socio) ecosystems of various size and assemblage. These dynamic small or larger scale systems are characterized by feedback interactions between soil characteristics, plant roots and ecodynamics of the associated microbial but also mesofauna communities that play an essential role in the transformation of organic matter, nutrients, and contaminants alike. However, the biodiversity of urban soils and the drivers that control this biodiversity are in fact poorly known.

The main thrust of this work was to improve the knowledge concerning soil biodiversity (microorganisms) and related ecosystem services in soils from urban soils from a temperate climate non-industrial medium scale city (Blois, Région Centre, France). Spatial variability of soil biodiversity was assessed together with geological, climatic and anthropogenic control factors including land occupation and use, land management trajectories and their histories.

One hundred thirty-five sites from Blois city were selected for soil sampling. Physical, geochemical and microbiological characteristics of surface soils were investigated. Soil was sampled either using an auger of 45 mm Ø at a depth of 0-10 cm or using rings (Sample ring kit, Eijkelkamp Soil and Water) of 84mm Ø at 10 cm depth. Soil water content (SWC) was measured by drying subsamples of fresh soil at 105°C for 48h. Soil elemental composition (C, N) was quantified with a Rock-Eval and a Flash EA 1112 elemental analyzers. Soil pH was measured in a 1:4 (soil/distilled water) solution. Bulk density, total soil porosity, water holding capacity, water filled pore space and gravimetric water content were obtained from the soil sampling with sample ring kit. Soil texture was obtained by using a texture test kit LaMotte (Model 1067). Soil respiration were evaluated by MicroRespTM method with an Omega SPECTROstar microplate spectrophotometer.

Results showed that the soil ecosystem have significantly influenced the functions of soil microbial community and hence probably its composition. More generally, diversity of soil microbial community is variable under the influence of land use and geological context.