SUITMA 11
11 th Conference on Soils of Urban, Industrial, Traffic and Mining Areas
Soils and the food, water, energy nexus
05.09.– 09.09 2022 Berlin, Germany

Indicators of urban soil multifunctionality as input to assess soil health

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Abstract (max. 400 words)

Soil quality must be taken into account to define soil use. While urban agriculture projects are multiplying, are urban soils of sufficient quality to accommodate such uses? We propose an interpretation of urban soil quality data acquired in 3 French cities as part of research projects (including MUSE) aimed at taking into account the multifunctionality of soils in urban planning and development.

Soils were sampled with a hand auger in vegetated soils along an urban-rural transect i) in the cities of Nantes and Châteauroux and ii) in a district of Marseille. In addition to a description of the soils (horizons, depth, traces of hydromorphy, coarse elements, etc.) and their environment, the samples were characterized in the laboratory (granulometry, pH, conductivity, CEC, total carbon, persistent pollutants, microbial molecular biomass and microbial biodiversity, etc.). The data were interpreted in terms of soil ecological functions (agronomic potential, water infiltration potential, organic carbon storage, biodiversity support). Soil multifunctionality is based on the notation of these functions according to a value scale. For the purpose of selecting areas for urban agriculture, the results can be interpreted from an "agronomic fertility" point of view, taking also into account the presence of contaminants.

Contrasts of multifunctionality within the sampled soils are observed between territories and within each territory. The soils of Nantes and Marseille, for example, show a lower microbial molecular biomass than those of Châteauroux. Some urban soils appear to be of better quality than neighboring agricultural soils. The influence of the physico-chemical properties, the microbial component and the degree of soil contamination on their quality will be discussed.

The multifunctionality approach allows a vision of the ecological state of soils, but is not sufficient to ensure their compatibility for urban agriculture. Assessing the threats to food security and soil health requires the development of guide values, particularly with regard to contaminants. Benchmarks of good ecological state of soils (including urban soils) would also make it possible to identify soils to be preserved for their heritage interest (few ecological functionalities but providing cultural and landscape services or presenting rare biodiversity) or for their strong multifunctionality.