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

Effects of urban soil quality on the nutritional status of woody plants in a Mediterranean climate city

Andrea Scartazza[1], Thais Huarancca Reyes[2], Daniela Di Baccio[1], Lorenzo Guglielminetti[2], Roberto Pini[1], Eliana Tassi[1], Carlo Calfapietra[1], Francesca Bretzel[1]*

[1]*Research Institute on Terrestrial Ecosystems, National Research Council, Italy*
[2] *Department of Agriculture, Food and Environment, University of Pisa, Italy*

*e-mail: francesca.bretzel@cnr.it

Environmental conditions (temperature and soil water content) and pollutants (N depositions) strongly affect decomposition rates of organic matter and nutrient cycling in urban soils.

In this study, we evaluated to what extent the soil physical and chemical properties were impacted by urban and peri-urban conditions in Pisa (Italy), a small medieval city with narrow streets that impede efficient public transport causing oversized private transport. Experimental period spanned from late-summer 2019 to spring 2020, before and after the COVID-19 pandemic lockdown in Italy. Climate and air quality were assessed throughout the experimental period.

Significant differences in atmospheric NO_2 concentrations between sites were maintained over time, with much higher NO_2 concentration in the urban site compared to the peri-urban one. Although very often urban soils lack in organic matter, both sites showed relevant content of nitrogen (N) and organic carbon (Corg), especially in the peri-urban soil which was also more aggregated and water stable than urban soil. Interestingly, a seasonality effect on some elements (i.e., Cu and Zn) at both sites was observed, which may be due to their mobility and bioavailability in specific season. Soil organic matter in the more polluted site was enriched in ^{13}C and ^{15}N, possibly due to a combination of enriched urban N sources and greater soil C and N cycling rates. This was reflected in an enhanced leaf N concentration in evergreen woody species [*Quercus ilex* L., *Nerium oleander* L. and *Pittosporum tobira* (Thunb.) W.T. Aiton] growing in the urban site compared to the peri-urban one.

This study demonstrates that, even in a small city, urban conditions influence soil properties and nutrient cycling, affecting plant nutritional status and its ability to provide key ecosystem services.