h e p i a
Haute école du paysage, d'ingénierie
et d'architecture de Genève

Rue de la Prairie 4
CH-1202 Genève

Tél. +41 22 558 50 10
hepia@hesge.ch
www.hesge.ch/hepia

Call for an internship connected with a Master's thesis

Microbial Controls on Organic Matter–Mineral Interactions in Constructed Technosols

Research institutions: HEPIA, Geneva, Switzerland & iEES Paris, France
Research framework: European Union – Horizon Europe
Project duration: 6 months
Languages: English and French required; German or other European languages are an advantage.

Background

Technosols constructed from excavated geological materials (EGM) offer promising opportunities for land rehabilitation and the sustainable reuse of excavation materials. However, the mechanisms controlling their physical structural development and long-term organic matter (OM) stability remain poorly understood. Previous research, conducted in collaboration with BRGM and CERN, investigated the relationships between soil physical structure and OM in constructed Technosols made from marly and sandy molasse excavated at CERN and combined with different organic inputs. Soil structure was characterised using shrinkage curve measurements, while OM was analysed using Rock-Eval pyrolysis.

Building on these results, this Master's project will investigate the role of microbial communities in the formation and stabilisation of Technosol structure in relation with OM content, using samples from a one-year incubation experiment. The project involves collaboration between HEPIA (Geneva, Switzerland) and iEES Paris (France), within a European research collaboration. This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101275935.

Financial support: A monthly allowance of CHF 700 is included for the duration of the Master's project.

Research objectives and activities

The main objective is to understand how microbial activity influences soil structural development and its interactions with hydrostructural properties and organic matter. The student will:

- Continue the experimental investigation of constructed Technosols using the 36 incubation units.
- Perform shrinkage curve measurements at HEPIA (Geneva) to characterise soil physical properties, including plasmic and structural porosity.
- Investigate microbial communities using DNA extraction, qPCR and metabarcoding technics and OM composition by infra-res spectrometry in collaboration with iEES Paris (France).
- Analyse the results using statistical and multivariate approaches to identify the main factors controlling Technosol development and stability and explore relationships between microbial activity, OM composition and soil structural evolution.

Candidate profile and application

We are looking for a motivated Master's student with a background in soil science, environmental sciences, agronomy, biology, ecology or related discipline. The candidate should demonstrate:

- An interest in soil physics, microbiology and laboratory experimentation.
- Motivation to work in an interdisciplinary and international research environment.
- Basic skills in data analysis and statistical analyses and interpretation.
- Good command of both English and French. Knowledge of German or other European languages would be an additional advantage.
- Previous laboratory experience in soil physics, microbiology and/or chemistry would be appreciated

Interested candidates should submit a CV, a short motivation letter and academic transcripts to : Prof. **Ophélie Sauzet** ophelie.sauzet@hesge.ch, Dr. Maha Deeb maha.deeb-collet@hesge.ch and Dr. **Thomas Lerch** thomas.lerch@u-pec.fr