

Master Thesis / Internship Project

Effects of organic amendments on soil EPS production and aggregation

1. Background

In natural environment, over 99% of microbial life live within biofilms (Potera, 1996; Vu et al., 2009). In soil. The development of soil biofilms affects the local soil physico-chemical properties. Biofilms are aggregates of microbes (bacteria, algae, fungi and protozoa), connected by extracellular polymeric substance (EPS) which comprises up to 80% of a soil biofilm's dry mass (Chenu, 1993; Vu et al., 2009). The EPS of mixed-species biofilms is primarily composed of carbohydrates/polysaccharides, proteins, and uronic acids, with smaller quantities of DNA and glycolipids (Flemming & Wingender, 2010). The biofilm-secreted EPS makes up the intercellular space of microbial aggregates, and develops connection among minerals and strengthens the internal cohesion of soil microaggregates (Lünsdorf et al., 2000; Vu et al., 2009). This can protect soil organic matter (SOM) effectively (Six et al., 2004) and maintain soil structure stability and functioning (Lentz, 2015).

2. Research objective and hypothesis

Soil provide habitats to an enormous diversity of microorganisms (Stackebrandt et al., 1993). The interactions of soil microorganisms are of great complexity, and understanding of biofilms in the soil is challenging. Although the protective features of soil biofilms against environmental challenges and the pronounced influence of organic amendments on soil characteristics are generally recognized, there are still fundamental questions to be answered. For example, the biofilm development processes in soil matrix with the presence of organic amendments, the biological determinants of soil biofilm formation, and the influences of microorganisms originated from organic amendments and their microbial community structures on soil biofilms are largely unknown. Standardized approaches to characterize biofilms in soil matrix are also lacking. Therefore, this research applies artificial soil and investigates the microbial growth and soil EPS production with application of different organic amendments (including compost, digestate, and bokashi).

3. Requirements

- Background in Environmental Science/ Microbiology /Soil Biology or equivalent;
- Great interests in soil microbiology and organic amendments;
- Good analytical and experimental skills;
- Experiences in microbial laboratory;
- Fluent in English and good English writing skills.

4. Duration, salary and location

- At least 6 month at Wetsus
- Allowance: 175 € per month
- Start: September 1st, 2021

5. Contact

Please contact Yujia Luo (yujia.luo@wetsus.nl) for more information or directly apply by sending your CV and motivation letter.