Lab of Excellence ARBRE

Recherches Avancées sur la Biologie de l'Arbre et les Ecosystèmes Forestiers

Funded by the Lab of Excellence ARBRE

A post-doc position is offered in the UMR Tree-Microbe Interactions and in the group Biogeochemical Cycles in Forest Ecosystems Departments

through the BRAWO project:

Fate of lignin altered by Brown Rot And White rOt fungi

Project

In forest ecosystems, the wood-rotting fungi play a central role in woody litter degradation. They are indeed the only microorganisms able to remove or circumvent the lignin barrier that hinders access to plant polysaccharides; the major plant tissues that can support microbial growth.

Wood-rotting fungi are categorized as white rot or brown rot fungi. White rot fungi degrade all components of plant cell walls, including cellulose, hemicellulose and lignin, primarily using enzymatic systems. Brown rot fungi employ a different biodegradative strategy. They generate hydroxyl radicals by a chelator-mediated Fenton reaction, these radicals being involved in the degradation of carbohydrates from plant tissues, leaving behind them modified lignin.

The brown rot fungi have been shown in recent molecular clock genomic analyses to have evolved from ancestral saprotrophic white rot fungi in a process accompanied by reduction of some cellulases and loss of all lignin-modifying enzymes. It has been suggested, but not verified, that brown rot fungi have cast off the energetically expensive enzyme system of lignocellulose degradation employed by the white rot fungi.

In this context, we want to explore the relationship between the strategies developed by brown rot and white rot fungi and the persistence of altered wood residues. **The proposed project pursues two main objectives. (i) to compare the energy cost and gains associated with the contrasted biodegradation strategies employed by white rot and brown rot fungi. (ii) to investigate the relationship between the chemical properties of the wood residues altered either by white-rot or brown-rot fungi and their persistence in soil.**

This implies to focus on the mechanisms involved in the wood degradation by white rot and brown rot fungi. Populus and Norway spruce will be inoculated by either brown or white rot fungus and incubated over several weeks. Change in substrate chemistry, CO_2 production and microbial biomass will be recorded over time. Secretome analyses will also be performed to relate change in substrate chemistry with the occurrence of enzymes. The wood substrate degraded by the white-rot or brown-rot fungi will then be incubated in soils with contrasted properties for one year and monitored for mass loss.

Required skills

This project combines physiological, biochemical and soil science approaches. The candidate needs to have a strong expertise in biochemistry, molecular biology, fungal microbiology or soil organic matter dynamics. For this project, she/he will benefit from the expertise of many scientists in the research units with a strong background in these disciplines. (see website: http://mycor.nancy.inra.fr/IAM/ and https://www6.nancy.inra.fr/bef_eng/)

Place of work: Stress Responses and Redox Regulation" team (http://mycor.nancy.inra.fr/IAM/?page_id=17). Faculty of sciences, Vandoeuvre-lès-Nancy, France

Form of employment: Temporary employment for 14 months funded by the Lab of excellence ARBRE, http://mycor.nancy.inra.fr/ARBRE/ starting in autumn 2018 (Sept-Oct or Nov).

Applicants should send a CV, including the names and contact details of three referees, and a covering letter addressing the selection criteria to Dr E. Gelhaye eric.gelhaye@univ-lorraine.fr or to Dr D. Derrien delphine.derrien@inra.fr.

Deadline for application: 30th of June 2018