

**Funded by the Lab of Excellence ARBRE**

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

**through the project:**

**Fate of lignin altered by Brown Rot And White rOt fungi**

**Project**

In forest ecosystems, the wood rotting Basidiomycota 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. They cannot grow on lignin alone but mineralize a large proportion of it into CO2 and H2O, making energy-rich polysaccharides accessible to the fungi and other microorganisms. Brown rot fungi employ a different biodegradative strategy. They generate hydroxyl radicals by a chelator-mediated Fenton (CMF) reaction to remove all carbohydrate from plant tissues, leaving behind them modified lignin. These hydroxyl radicals depolymerize lignin and carbohydrate, enabling the diffusion of oligosaccharide into wood cell lumen where fungal enzymes are located. 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 explore the relationships between the strategies developed by brown rot and white rot fungi and the chemical properties of the altered residues and their persistence in soil. This imply to focus on the mechanisms involved in the wood degradation by white rot and brown rot fungi, with a special emphasis on Fenton, and chelator-mediated Fenton reaction mechanisms

**Required skills**

This project combines genomic, physiological, biochemical and chemical approaches. The candidate needs to have a strong expertise in molecular biology, fungal microbiology and physiology. For this project, he will benefit from the expertise of many scientists in the research units (see website: <http://mycor.nancy.inra.fr/IAM/> and https://www6.nancy.inra.fr/bef\_eng/) with a strong background in these disciplines.

**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.

Applicants should sent 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](mailto:eric.gelhaye@univ-lorraine.fr) or to Dr D. Derrien [delphine.derrien@inra.fr](mailto:delphine.derrien@inra.fr).