Funded PhD subject

Developmental plasticity of the poplar root system in response to physical soil heterogeneities

Context and project
The root system development responds to soil chemical and physical variations, such as water and nutrient availability, fungal signals or mechanical impedance. Root growth and lateral root production are finely regulated processes leading to resources acquisition optimization (Rellan-Alvarez et al., 2016). However, the developmental responses of the root system to a localized constraint are badly known, in particular their dynamics and the response specificity of the different root types. In addition, the local and systemic signalisations involved in the developmental plasticity of the root system have been overlooked (Rosales et al. 2019).

The first objective of the thesis is to characterise the developmental plasticity of the root system of young plants of poplar grown either in vitro or in rootboxes by manipulating the growth media to produce localised constraints including water deficit and mechanical impedance. A second objective aims at characterising the local and systemic signalisation of the plasticity using transgenic lines affected in the perception or the biosynthesis of different hormones.


Scientific group:
This project will be done in the Phare team of UMR Silva (https://www6.nancy.inrae.fr/silva_eng/Research-teams/PHARE) where the supervisors study the biophysical and molecular controls of root growth in response to environment, with multidisciplinary approaches.
This project will be conducted in collaboration with Claire Veneault-Fourrey (UMR IAM). The successful applicant will benefit from the supervisors’ national and international scientific networks, from support of the technical team and from our root system imaging facility.

Recent publications
Laboratory: UMR SILVA, INRAE, Centre Grand-Est Nancy, 54280 Champenoux
https://www6.nancy.inrae.fr/silva_eng/

Supervisor: Marie-Béatrice BOGEAT-TRIBOULOT, marie-beatrice.bogeat@inrae.fr
Co-supervisor: Irène HUMMEL, irene.hummel@inrae.fr

Doctoral school: SIReNa – Science et Ingénierie des Ressources Naturelles (Lorraine University)

Salary: Approximatively 1420 € per month, 3 years
PhD start: 1st October 2020

Skills: Applicants should hold a Master 2 (or equivalent). Skills in experimentation, in vitro culture or image analysis are desirable. Interest in development biology or root biology, in plant response to abiotic stress and a good English level will be welcome.

To apply: Please send your curriculum vitae, a covering letter including the coordinates of at least a referent to marie-beatrice.bogeat@inrae.fr et irene.hummel@inrae.fr

Closing date: 20th June