Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

PhD project: Root dynamics and ecosystem function

We invite applications for a fully-funded (candidates eligible for EU and UK fees only) 4-year PhD project within the Plant-Soil Function group in the Discipline of Botany, School of Natural Sciences at Trinity College Dublin.

Project background and description

Root properties are major uncertainties in many climate- and sustainability- related fields. As observations above-ground are comparatively easier and faster, assumptions are commonly made about root dynamics and phenological in both field observations and models. Plants are phenotypically plastic and respond flexibly to their environment but also are constrained by limits of physiology. This means root and leaf dynamics may be tightly synchronized and bidirectionally predictable, or they may not.

A variety of studies have already shown indications that root and leaf phenology may decouple from point measurements. But fully realized belowground timeseries are not routinely available. There is also no general theory of when and why roots grow, which could underly improved understanding of soil greenhouse gas fluxes and ecosystem function.

In this project the candidate will develop and employ methods to validate timeseries of root properties from images. The candidate will be work with a new and globally unique network of automated minirhizotron field sites, with custom instruments capable of capturing images of root dynamics on sub-daily timescale. They will be supported by GPU and root and soil analysis facilities within the Plant-Soil Function group at Trinity College Dublin.

Fieldwork for this project will take place at ecosystem measurement sites in Ireland, the UK, and/or Spain. The project is integrated into initiatives to measure GHG fluxes via Eddy Covariance and above-ground phenology and will allow co-interpretation of how root dynamics underly ecosystem function. There will also be the opportunity to design and construct manipulative experiments and/or advance the computer vision part of the project, depending on the skills and interests of the successful candidate. International conference attendance and a short international research stay is also expected as part of this project.

This PhD is part of a Taighde Éireann – Research Ireland (formerly Science Foundation Ireland) / Royal Society University Research Fellowship ‘RODEO: Root Dynamics for Ecosystem Observation’ which aims to advance understanding of whole plant phenology as control on greenhouse gas exchange under real ecosystem conditions.

Candidate profile

The ideal candidate will:

- Hold a Bachelor or Masters degree in ecology, geosciences, environmental science, plant sciences, mathematics, computer science or another relevant discipline.
- Have experience in root or soil science, preferably under field conditions, or background in a relevant plant sciences or theoretical field with a clear motivation to work on a project including a plant-soil fieldwork component
- Have demonstrable quantitative skills, including ecologically-relevant statistical methods
- Have previous programming experience (e.g. R, Python) or a background in relevant fields and a demonstrable willingness to learn programming
- Preferably hold a valid driving license
- Meet the Trinity College Dublin postgraduate entry requirements

Funding

This is a 4-year PhD project funded by Taighde Éireann – Research Ireland (formerly Science Foundation Ireland) and covers an annual stipend of €25,000, as well as project costs and EU student fees (funder constraint). EU fees apply to anyone who has worked or studied in the EU or UK for at least 3 out of the last 5 years, more details here: https://www.tcd.ie/academicregistry/fees-and-payments/applicants/what-are-my-fees/.

Application

Please send a CV and a 1-page personal statement detailing why you are interested in the project and names and contact details of two referees, with first review on the 21st October 2024 17:00 GMT by email to Dr. Richard Nair richard.nair@tcd.ie with the subject line 'Root Dynamics PhD application'

Given sufficient suitable applications, interviews for this position will be held in the week of 11th November 2024.

Project starting date: January 2025.

The personal statement should contain details of why you want to do a PhD and why you want to do this particular PhD.

We strive for a bias free recruitment process so we ask you to not send CVs that include a photo or information of a personal nature (e.g. age, marital status, nationality). Statements will be read before CVs. We encourage applications from underrepresented groups in STEM.

Please address all enquiries by email to Dr. Richard Nair, richard.nair@tcd.ie

Links

Botany at Trinity College Dublin: https://www.tcd.ie/Botany/

Social Media and Website: https://linktr.ee/richardnair