



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

### **Fully funded PhD Opportunity**

Plant Ecophysiology Research Group  
Botany Department, School of Natural Sciences,  
Trinity College Dublin

### **Assessing the role of multispecies GRAssland swarDs on clImatE mitigatioN, water quality and productiviTy in Ireland (GRADIENT)**

#### **Project Background and description**

Agriculture dominates the Irish landscape, with ~60% of the total land area devoted to grass-based agriculture for beef and dairy production. However, this type of land use has significant environmental implications, as the agricultural sector accounts for ~30% of national greenhouse gas (GHG) emissions and can have negative impacts on both surface and groundwater quality. These systems provide food for a growing population but need to rapidly develop more sustainable approaches in order to move towards carbon neutrality and to meet emission reduction targets and water quality legislation. Coupled with this there, is a requirement to better understand the carbon and greenhouse gas dynamics of these ecosystems, to determine the drivers of emissions and how these change with variations in management and climate. This project will assess how alternative planting mixtures and management interventions can reduce gaseous and aquatic emissions of carbon and nitrogen and further our understanding of the drivers and spatio-temporal variability in emissions. This work will then directly contribute to enhancing the sustainability of grassland production in Ireland.

The objectives of this project are to:

- Utilise the national agricultural soil carbon observatory to identify sustainable grassland management practices that balance agricultural production with environmental emissions.
- Complete the greenhouse gas balance (carbon and nitrogen) of conventional grazed ryegrass clover systems compared to the more sustainable multispecies sward systems and zero grazing management approaches
- Capture hot-spot and hot-moment emission profiles associated with inter-annual climatic variability and management intervention
- Assess the variability of microbial diversity and abundance in grasslands soils and the influence this might have in driving N<sub>2</sub>O production and emission.
- Identification of potential microbial sources and sinks of N<sub>2</sub>O from grassland systems

- Investigate the hydrological characteristics of these systems to determine losses of dissolved C and N and related impacts on groundwater and surface water quality.
- Optimise management strategies in these agro-ecosystems to contribute to emissions savings and the pathway to net carbon zero agricultural systems.

#### **Candidate requirements:**

- Applications are invited from graduates holding a first or 2.1 class honours degree or M.Sc. in Biochemistry, Soil Science, Agricultural Science, Environmental Science or related discipline.
- The successful candidate should be practically and technically minded, and interested in using state-of-the-art technology and sensors to measure terrestrial C/GHG dynamics.
- The candidate should be self-motivated, prepared for extensive field-based and laboratory work and someone who enjoys data analysis, writing and communicating/disseminating their work.
- Prior experience in measuring carbon and greenhouse gas dynamics of terrestrial systems would be advantageous.
- A full, clean Irish/European driving licence and fluency in English are essential.

#### **Award:**

The successful candidate will be enrolled for a 48-month (Structured) Research PhD programme in the Botany Department in the College of Natural Sciences, Trinity College Dublin. The Fellowship provides University fees and a stipend of **€18,500 per annum for a duration of four years**. Funds for project costs are also provided.

**Application deadline:** 31<sup>st</sup> October 2022 by 5pm (Irish local time)

**Start Date:** January 2023

#### **Application Procedure:**

Interested applicants should submit, within a single PDF document, a CV with educational background, transcripts of degree results, list of publications and conference presentations, a short (1–2 page) letter of motivation and contact details for 2 referees submitted directly to Dr. Matthew Saunders ([saundem@tcd.ie](mailto:saundem@tcd.ie)). The motivation letter should clearly state how the applicant's research interests and skills relate to the research project outlined above.

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