



TEAGASC PHD WALSH FELLOWSHIP OPPORTUNITY

“Investigating the impact of nitrogen source and management on nitrogen cycling and nitrous oxide emission from agricultural soils using Cavity Ring Down Spectroscopy”

Walsh Fellowship Reference: **2016075**

Background

Increasing nitrogen (N) efficiency in agricultural production will be critical to achieving sustainability both in financial and environmental terms. Conventional agricultural production is highly dependent on nutrient inputs of N in fertilizer and feed. Inefficient use of this N input is associated with decreased profitability but also increased emissions of the potent GHG nitrous oxide (N₂O).

Developing nutrient best management practices (BMPs) to mitigate N₂O emissions will be increasingly important. This will require greater understanding of the pathways that lead to N₂O emissions.

Cavity Ring-Down Spectroscopy (CRDS) is a novel and emerging laser-based analytical method for determination of N₂O in gaseous samples and allows simultaneous determination of both N isotope ratios ($\delta^{15}\text{N}$) and site-specific isotopomers. This analytical approach can thus provide the necessary information on concentrations emitted but also help to reveal the pathways and sources of the emitted N₂O. A CRDS instrument for N₂O analysis has recently been installed in the UCD Earth Institute.

The objectives of this PhD fellowship will be to: 1. Develop and establish the analytical techniques for CRDS determination of N₂O concentrations, isotope ratios and isotopomers in gaseous samples, 2. Apply these techniques to the study of the pathways and sources of these emissions to improve our understanding of the processes involved and where we might target future emission mitigation nutrient BMPs. The role of the rhizosphere in regulating soil N cycling and N₂O emissions may also be investigated.

Requirements

Applicants should have a primary degree (ideally ≥ 2.1) and/or M.Sc. in an appropriate discipline (Chemistry, Agricultural Science, Environmental Science, Earth Science, etc.). The successful candidate should be highly self-motivated and be prepared for laboratory work and extended periods of field work with modern analytical equipment. Field sampling and laboratory experimental and analytical skills and experience are highly desirable. A good knowledge of Irish grass-based agricultural production systems and farm nutrient management practices is desirable. The applicant should have a good working knowledge of English (spoken and written) and hold a full EU driving licence.

Award

The PhD Fellowship is a joint research project between Teagasc, Johnstown Castle, University College Dublin (UCD), and Justus-Liebig-Universität Giessen (UG), Germany. The student will be based, in the first instance, at UCD where they will be registered as a postgraduate student, and will also spend time, as required, at the Teagasc Research Centre at Johnstown Castle, Co. Wexford. The student will work under the supervision of Dr Paul Murphy and Dr Saoirse Tracy (UCD), Dr Gary Lanigan and Dr Karl Richards (Teagasc), and Dr Christoph Mueller (UG/UCD). The Fellowship will start as soon as possible after 1 September 2016, and/or once the most suitable candidate is appointed thereafter.

The fellowship provides a stipend of €22,000 per annum. University tuition fees are paid by the student from the stipend which is tenable for 4 years, to be completed by the end of September 2020.

Further Information/Applications

Contact Dr Paul Murphy, Environment & Sustainable Resource Management Section, School of Agriculture and Food Science, University College Dublin, Belfield, Dublin 4, Ireland.

Phone +353 (0)1 7167733 email: paul.murphy@ucd.ie

Contact Dr Gary Lanigan, Teagasc, Johnstown Castle, Wexford, Republic of Ireland

Phone +353 (0)53 917 1216 email: gary.lanigan@teagasc.ie

Application Procedure

Submit an electronic copy of Curriculum Vitae and a letter of interest simultaneously to: Dr Paul Murphy (paul.murphy@ucd.ie) and Dr Gary Lanigan (gary.lanigan@teagasc.ie).

Closing date: 18th July 2016, or when a suitable candidate is identified.