

Chemosynthetic pathways to increased carbon dioxide sequestration and improved productivity in soil

Project description

Knowledge of carbon sequestration in soil is imperative if we are to understand carbon cycling and its role in sustainable agriculture and climate change. Through work conducted by our research group, there is now a realisation that microbial biomass contribution to soil and to CO₂ sequestration is seriously underestimated. In a recent publication we outline a methodology that can, for the first time allow us to follow the fate of microbial carbon in soil over time, identify novel species that assimilate CO₂ and quantify CO₂ uptake. We found that chemoautotroph bacteria can use an electron-donor and that CO₂ uptake increases by at least an order of magnitude when we apply it to soil. This approach represents a first step in understanding the fate and dynamics of microbial carbon in soil. The next step is to apply these approaches to develop and verify management procedures that encourage carbon stabilisation.

Our proposed strategy is to integrate metagenomic microbial science with advanced analytical chemistry techniques using stable isotopic methods with ¹³C labelled compounds to study microbial chemoautotrophy in soil in both a qualitative (i.e. identify community components) and quantitative (i.e. measure rates of CO₂ fixation) tandem approach. This PhD will concentrate on the chemical analysis required to understand the fate of this carbon in soil.

Person Specification

Candidates must have a minimum of an honours degree in an analytical chemistry, environmental chemistry or relevant chemistry or science-based subject and have an overall grade of 2.1 or higher. Students with experience in analytical or chemical methods and with a real interest in pursuing research are particularly encouraged to apply. The successful student will be based at Dublin City University (DCU) and the PhD position will commence on the 1st Sept. 2018.

Dublin City University

The PhD student is assured of dedicated laboratory, core facilities and office space at the School of Chemical Science, the National Centre for Sensor Research and the new Bioanalytical Research Facility in DCU where the suite of mass spectrometry instruments will be of particular use.

Contact information

Informal queries are welcome.

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