4 year PhD Studentship

Agriculture, Environment & Food Security:

Nitrogen Use Efficiency in N\textsubscript{2} fixing systems

School of Chemistry, University of Bristol
& Rothamsted Research, North Wyke

A 4-year studentship funded by the BBSRC SWBio Doctoral Training Partnership is available for September 2020. The successful candidate will register for a PhD at the University of Bristol, under the supervision of Professor Richard Evershed (School of Chemistry, Bristol University) and Dr Laura Cardenas (Rothamsted Research).

Inefficiencies in N use in agriculture arise from over fertilisation and asynchrony between nutrient supply and crop demand. The use of legumes, is a good strategy for minimising fertiliser N application in agriculture, as their rhizosphere competent and symbiotically associated rhizobia are able to fix atmospheric N\textsubscript{2} (Biological Nitrogen Fixation, BNF) and convert it to NH\textsubscript{4}\textsuperscript{+} that can then be used directly by crops or indirectly after nitrification to NO\textsubscript{3}-. There is considerable potential for growing N\textsubscript{2} fixing species with other crops as the former can provide N in the form of NH\textsubscript{4}\textsuperscript{+} minimising the need for external additions of fertiliser N. Although the later approach is applied in different parts of the world the optimal plant combinations and mechanisms of nutrient transfer are unknown.

We propose to investigate the biogeochemistry of intercropping in a variety of N\textsubscript{2} fixing species combined with other crops and estimate their NUE, to optimise crop combinations and clarify the biochemical and biophysical mechanism(s) by which legume fixed N\textsubscript{2} is accessed by crop plants. We will achieve this by employing state-of-the-art \textsuperscript{15}N stable isotope probing methods, which will allow exploration of the pathways and dynamics of N transfers to be elucidated for the first-time.

The student selected for this project will be supervised by Professor Richard Evershed FRS, Organic Geochemistry Unit, School of Chemistry, University of Bristol and Dr Laura Cardenas, Rothamsted Research, North Wyke, Devon. The student will gain experience in the use of the latest molecular and stable isotope methods applied to soil biogeochemistry. Students with previous experience in analytical chemistry, geochemistry and biogeochemistry, are especially encouraged to apply. Quantitative skills and experience with the use of spreadsheets are desirable.

Applicants should apply through the SWBio DTP portal

https://www.swbio.ac.uk/programme/projects-available/

Application deadline: Midnight, Mon 2nd December

Enquiries to Richard Evershed r.p.evershed@bristol.ac.uk or Laura Cardenas laura.cardenas@rothamsted.ac.uk