PhD Project Advertisement

Project title: Accelerating the transition to regenerative farming for high carbon organic soils
Project No: FBS2023-22-Hannam-cr

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Co-supervisors:
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Project description:

UK agriculture is an important source of greenhouse gas emissions. The government has set ambitious Net Zero targets for reducing the country's emissions but for the agricultural sector this should not compromise food and nutritional security. In the UK, lowland peatlands (waterlogged, high carbon soils) once covered 290,000 ha and are an important UK carbon store. However, drainage has converted much of this land to highly productive agriculture, vitally important for UK food security, but also driving peat degradation (NE, 2010). While intact peatlands are long-term carbon sinks, drained peatlands are major GHG sources, particularly for carbon dioxide (CO_2).

Regenerative agriculture offers one potential approach to reduce greenhouse gas emissions from farming, benefit soil health and enhancing soil carbon sequestration. It describes a broad set of principles based on improved soil management and includes reduced tillage, cover-cropping and grazing. It has substantial potential for improving soil health, soil carbon sequestration, and reducing greenhouse gas emissions but to date most studies have focussed on benefits for mineral soils. Little is known about the extent to which such practices can reduce carbon losses from high carbon peat soils.

In addition, in order to meet net zero targets, many farmers are keen to transition to regenerative principles as quickly as possible, but little is known about how this can be achieved. This project aims to address this challenge but quantifying the impacts for soils, greenhouse gases and crop yields from rapid transitions to regenerative farming principles on high carbon peat soils in the Cambridgeshire Fens, and to demonstrate impacts at field to farm scales. Measuring before, during and after the transition allows a whole-system assessment of impacts and can help inform farmer decision-making for the adoption of regenerative principles for organic soils. This project addresses these challenges.

The successful student will undertake extensive measurements of soil health, soil carbon, and greenhouse gas emissions across a range of regenerative agricultural management practices on high carbon peat soils in the Cambridgeshire fens, and important UK lowland peatland region. Management practices include 1) zero tillage and multi-species cover cropping (incorporating many species into a cover crop mixture as opposed to bare soil in conventional systems); 2) zero tillage, cover-cropping and mob grazing; 3) zero tillage and multi-species cover cropping established two years ago (allowing an assessment of longer term benefits); and 4) conventional management. The student will measure and monitor impacts on soil properties, carbon and greenhouse gas emissions intensively over three years. They will use the data build a whole-system understanding of the impacts of different regenerative practices on emissions, and the integrated benefits of multiple practices through time. They will integrate data through ecosystem-process modelling, and finally use future climate scenarios to understand the potential impacts of environmental change on greenhouse gas emissions, soil carbon, and crop yields. During the project, they will have the opportunity to undertake a three month placement with G's Growers, allowing them to understand farmer perspectives of regenerative farming on peat soils.

Training opportunities:

The student will be tutored on a range of GHG, soil, and plant analyses, statistical analysis, and biochemical modelling by Girkin and Hannam. At Cranfield, the student will complete the Soil Systems MSc module, receiving a detailed introduction to soil processes in agriculture. The student will be trained at Reading in undertaking various measurements for characterising soil health and developing and applying suitable indices for monitoring. They will be able to expand their knowledge of cover-crops through exposure to ongoing relevant BBSRC projects at Cranfield (BB/R003440/1) and Reading (BB/R006989/1).

Training in transferable skills (e.g. presentations and communication) and enhancement of the employability of the student will be available through DTP partners and Cranfield's short course programme. The student will also benefit from undertaking a minimum three month placement to understand farmer-perspectives of continued farming over peat, and ensure their findings are farmer-orientated.

Student profile:

We seek applicants with a BSc honours degree at upper second class level (or equivalent) in Environmental Science, Agriculture, or Physical Geography with a good knowledge of soils and farming. Laboratory skills, fieldwork experience and experience of working with farmers and growers is desirable. A driving license is desirable for travel to field sites. We particularly welcome applicants from diverse and under-represented backgrounds.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax free stipend (salary) that is paid in instalments throughout the year. For 2022/23 this will be £17,668 and this will increase slightly each year at rate set by UKRI.

Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, diversity and inclusion (EDI), to building a doctoral researcher(DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups. Our actions to promote diversity and inclusion are detailed on the FoodBioSystems DTP website.

In accordance with UKRI guidelines, our studentships are offered on a part time basis in addition to full time registration. The minimum registration is 50% FT and the studentship end date will be extended to reflect the part-time registration.

References:

For up to date information on funding eligibility, studentship rates and part time registration, please visit the FoodBioSystems website.