

PhD Project Advertisement

Project title: Integrating trees into arable systems to improve soil health & provide resilience to climate change

Project No: FBS2022-53-Potts-rc

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Project description:

Mitigating climate change and adapting to its impacts are two of the foremost challenges in agriculture. In the UK, increasing droughts and periods of heavy rain has significantly reduced arable production in recent years. This, in combination with policy changes and burgeoning carbon credit schemes (i.e. where farmers are paid to store carbon), has brought climate change to the forefront of farmers' minds, and there is growing interest in finding new ways to both mitigate and adapt to its impacts.

Agroforestry can contribute to climate change mitigation, and the practice of silvoarable farming (i.e. intercropping arable crops with trees) is gaining traction in the UK. Recent studies have shown that it can increase carbon sequestration, reduce net greenhouse gas emissions and support more biodiversity than traditional arable systems. In addition to helping to mitigate climate change, silvoarable systems may also be more resilient to the impacts of climate change. For example, they have more complex root structures, and this could help soils to maintain the water they need in times of drought or heavy rain. Despite this, silvoarable farming is rare in the UK, and many knowledge gaps remain. Very little is known about the impact of silvoarable farming on soil biodiversity and health, and as soils are the foundation of agricultural production, it is imperative that this knowledge gap is addressed.

In this project, you will study the impact of silvoarable farming on soil health and experimentally test climate resilience using a drought experiment. As the impact of silvoarable farming may change as the trees mature, you will study this using a 22-year tree-planting gradient. We have partnered with five silvoarable farms across Southern England to conduct this experiment.

Objectives and hypotheses

- 1) Determine the impact of silvoarable farming on soil health by comparing arable fields with silvoarable fields along a 22-year tree-planting gradient. You will measure soil biodiversity, soil physical properties (e.g. soil porosity), and soil chemical properties (e.g. carbon).
- 2) Determine the extent to which silvoarable farming can increase the resilience of arable farming to climate change by conducting drought experiments using tents. You will compare soil properties and crop yield and quality between tented areas and open areas in silvoarable and arable sites to test which system is more resilient to drought.
- 3) Disseminate the findings to the scientific community, the agricultural sector and the public via conferences, publications, and wider media.

Outcomes

This study will provide the key evidence needed to assess the impact of silvoarable farming on soil health and climate resilience. Working with our industry stakeholders LEAF and the Woodland Trust, we will ensure that our findings are disseminated to farmers, thereby increasing the sustainability of UK farming.

Training opportunities:

The student will be trained in ecology, agronomy, invertebrate taxonomy, soil sampling techniques, experimental design, statistics, and paper writing from the supervisory team at the University of Reading (UoR). They will receive a Learning Needs Analysis to identify appropriate courses run at Reading, and they will receive external training, such as identification courses by the Field Studies Council, where necessary. They will be able to attend relevant lectures and seminars provided by the School of Agriculture, and will develop their teaching and presenting skills via these seminars and at academic and farmer conferences. Through the supervisory team the student will have access to several large multi-partner projects (UKRI, H2020) where they will be able to participate in training workshops and network with internationally recognised leaders in the field. Equality, diversity, and inclusion (EDI) training and opportunities to sit on EDI committees will be offered at UoR too.

Cranfield University will provide training on the modelling of tree-crop interactions, including carbon sequestration, the impacts of shading, and water use. Cranfield University also has strong links with other agroforestry network across Europe.

Student profile:

The student will have a relevant BSc in ecology, agriculture or environmental science. They will have an understanding of food production, agronomy, or entomology. Experience doing fieldwork, working in agricultural landscapes or measuring soil health is desirable. Ability to travel to field sites, stay overnight there sometimes, and work independently is essential.

Funding particulars:

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