

Project title and location:

Growing systems for sustainable soils and societies: Investigating the impact of tillage type and production inputs on crop performance, soil health, below-ground biodiversity and carbon building capacity – Newcastle University

IAFRI background:

The Institute for Agri-Food Research and Innovation (IAFRI) is a joint venture between Newcastle University and Fera Science Ltd and a unique model for how universities can work with private sector research organisations. It operates under a private-public ownership to deliver both public good research and services as well as innovation and wealth creation in strategically important industrial sectors in the UK. Students will have a unique opportunity to benefit from supervision and facilities at both the Newcastle and Sand Hutton campuses to deliver research with real-world impact.

Lead Supervisors (and contact): For more information and details on how to apply please contact Dr Julia Cooper (julia.cooper@newcastle.ac.uk) and Dr David George (david.george1@newcastle.ac.uk)

Key research gaps and questions:

Current social, environmental and political drivers will shape the future of global agriculture and place increased emphasis on our cropping systems to deliver healthy, biodiverse soils that can simultaneously store carbon and feed a growing human population. The role of selected key land management practices and isolated crop input types and intensities in delivering gains to any one of the above goals is relatively well understood. Less is known, however, about how combinations of land management and crop inputs act to exert effects on soil health, below-ground biodiversity, carbon building capacity and crop production.

Project Description:

The project will utilise the analytic capacity of Fera's newly-established Big Soil Community platform, and the expertise of Newcastle University staff in carbon cycling and soil/biodiversity/crop assessment, to fill the above knowledge-gap using the University's long-term 'QLIF' field plots, based at Nafferton Farm. Within this platform four replicated production practices are already being investigated at semi-commercial scales, broadly classed as 'organic', 'high input conventional', 'bioprotectant driven' and 'carbon building'. Two opposing tillage operations have been overlaid onto these four input treatments, representing inversion (ploughing) and non-inversion (direct-drill) approaches. By leveraging this significant existing experimental resource, and supporting field sampling from it with laboratory work at Fera at Newcastle, this project will explore how the varied combinations of land management and input provided by QLIF effect soil health, below-ground biodiversity, carbon building capacity and crop production (in terms of yield, quality and pest and disease pressure). In addition, data collected in multiple field seasons will allow relationships between these variables to be assessed across systems and over time, for example to define the strength of expected correlations between soil health and carbon, the robustness of relationships across the different production practices and seasons under study, and the possibility that benefits can be 'stacked'.

Desired skills:

Applicants should have an interest in future farming systems, preferably with emphasis on soils, biodiversity and/or soil carbon sequestration.
Applicants should possess a 2:1 or above in a related discipline and hold a driving license to permit regular travel between the NU main campus and NU Farms.