Project title: FBS2021-37-Johnston: Optimizing UK landscapes for agroecosystem resilience

Lead supervisor: Alice Johnston, Cranfield University, Environment & Agri-food
Email: a.s.johnston@cranfield.ac.uk
Co-supervisors:
Simon Potts, University of Reading
Tania Alvarez, Syngenta Ltd
Jacqueline Hannam, Cranfield University

Project description: Biodiversity loss is an existential threat to global food security, and agriculture plays a pivotal role in the protection of species for agroecosystem resilience. Functionally important bioindicators, such as earthworms, collembola, and hoverflies, play important roles in multiple agroecosystem functions (e.g. soil structure, carbon cycling and pollination), but their populations can decline drastically in response to agricultural practices. Landscape composition (e.g. habitat quality and connectivity) can alleviate or exacerbate the effects of management practices, but population responses depend on interactions between species traits, environmental factors, and their exposure to multiple stressors.

Predictive tools are needed to better understand and predict the effects of multiple agroecosystem scenarios on key bioindicators, to support sustainable agricultural management decisions. This project will develop a mechanistic landscape-scale model for several bioindicators to predict the consequences of multiple environmental changes on agroecosystem resilience.

A mechanistic modelling approach will be adopted, in which species population dynamics emerge from individual physiological and behavioural responses to shifting landscape, environmental, and management scenarios in spatially explicit landscapes. Models will be extensively validated with UK biodiversity datasets and applied to investigate optimal agricultural landscapes for key bioindicators and ecosystem resilience. Model outcomes have important implications for environmental and agricultural policy at the national and international scale.

Training opportunities: Specialist training will be offered in individual-based modelling in RNetLogo and fieldwork. Collaboration with Syngenta offers additional opportunities to develop transferable skills and translate new scientific understanding into improved agricultural practice.

Student profile: We encourage applications from all relevant disciplines, with a minimum 2:1 or equivalent post-graduate work experience. We particularly welcome applications from diverse and under-represented backgrounds and can offer flexible working arrangements.

Funding particulars: The project is CASE funded by Syngenta, providing £3,420 p.a. in addition to the basic stipend plus fieldwork, travel, and training expenses.

The project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants.
The studentship is open to UK and international students (including EU countries) however due to funding rules, no more than 30% of the projects can be allocated to international students.
The funding will include a tax free stipend (minimum £15, 285 per year), support for tuition fees at the standard UK rate (currently £4,407 per year) and a contribution towards research costs. **Please note** that the host universities have not yet confirmed the level of fees charged to international students funded by the DTP. Fee levels may vary across the institutions. This information will be shared on the FoodBioSystems DTP website as soon as it becomes available.

To apply
Please go to FoodBioSystems DTP website for information on how to apply for this studentship. The closing date for applications will be 8 February 2021.