PhD Project Advertisement

Project title: *ValueWaste: Revealing the potential of Organo-Mineral Fertilisers to enhance crop productivity, as well as improve soil health and sustainability.*

Project No: FBS25-76-Rampelos-lc

Lead supervisor: Dr Leonidas Rempelos, School of Agrifood Technology and Manufacturing, University of Lincoln

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Co-supervisors:

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Dr Iain Gould, LIAT, University of Lincoln

Project description: The UK imports a significant amount of unsustainably mined phosphorus, with low deployment efficiency leading to environmental issues like eutrophication. Organic waste streams (e.g., manure, sewage sludge) offer potential for sustainable phosphorus use but are challenging to transport and apply. In addition, issues such as variability in recovered phosphorus fertiliser nutrient content and stability, low micronutrient absorption in plants and insufficient assessment of environmental impacts have led to low end-user uptake.

This exciting PhD project aims to develop a groundbreaking solution by using blends of organic waste residues as carriers for the creation of pelleted Organo-Mineral Fertilizers (OMFs) to enhance crop growth, yield, and quality, as well as improve soil health and sustainability, reducing the carbon footprint of crop production. The project will involve the development of a range of pelleted OMFs by blending different combinations/ proportions of organic waste, with varying levels of mineral macro-micronutrient supplementation and the use of state-of-the-art sensor technologies to compare OMFs nutrient release/availability patterns and assess the potential of multiple wheat genotypes to grow with OMFs. Outputs will be scaled/validated on field trials, where the influence of OMFs accompanied by microbial biostimulants and nutrient-efficient wheat genotypes on enhancing soil health/ nutrient dynamics will also be evaluated.

Training opportunities: The project offers training covering cross-disciplinary technical and transferable skills. Training would be provided via both partners for the use of (1) various multispectral 3D scanners for canopy/ root phenotyping and image analysis to visualize plant growth and calculate a wide variety of morphological/ physiological parameters and (2) AAS, ICP-MS for heavy metal analysis, Elementar analysers for carbon, segmental flow analyser for nitrate and spectrophotometer for phosphorus analysis. Other training opportunities include the attendance on MSc modules in areas such as soil science, plant genetics and food quality or image/ data processing, data mining, data programming in R/Python. The student will also benefit from the University of Lincoln's Graduate School training on research skills, scientific writing, and personal development.

Project supervision style: The student will be supported by a lead supervisor and two co-supervisors representing different disciplines. The lead supervisor will be providing overall guidance and feedback, while the other members of the team will be offering specialized support/ additional feedback. In weekly 1:1 supervision and monthly full supervision team meetings progress, challenges, review of experimental results and plan next steps will be discussed. Written feedback will be provided within two weeks of submission while oral feedback will be given during meetings. To effectively student track progress, clear action items/ deadlines will be assigned, ensuring accountability and timely completion of tasks. Decisions made, actions and follow-up points will be minuted and shared with all participants for reference. The student will also be providing regular progress reports summarizing completed tasks, ongoing work and challenges faced.

Student profile: This project is ideal for candidates with at least BSc (2:1) honors degree in Agricultural Sciences and Technology, Agronomy, Plant Science, Soil Science, Environmental and Biological Science, Geography or Chemistry. Candidates from disciplines which are not directly related to the project research area should demonstrate their ability to learn and apply new concepts and skills.

Stipend (Salary):
FoodBioSystems DTP students receive an annual tax-free stipend (salary) that is paid in instalments throughout the year. For 2024/25 this is £19,237 (£21,237 at Brunel University) and it will increase slightly each year at the rate set by UKRI.

Equity Diversity and Inclusion:
The FoodBioSystems DTP is committed to equity, 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 and include:

- Offering reasonable adjustments at interview for shortlisted candidates who have disclosed a disability or specific learning difference.
- Guaranteed interview and applicant mentoring schemes for applicants, with UK home fees status, from eligible under-represented ethnic groups.

These are opt-in processes**.**

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.

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