Job Description & Person Specification

Section 1
Role Overview

Job title:	Research Fellow in Modelling Root-Soil-Fungi Interactions for Climate-Resilient Crops
Vacancy reference:	5434
Faculty:	Engineering & Applied Sciences
Theme:	Environmental Sustainability
Job type:	Full time Fixed Term Contract until 30 September 2028
Hours of work:	37 hours per week, normally worked Monday to Friday. Flexible working will be considered.
Salary details:	Salary level 5 – range £38,655 to £46,492 per annum with potential progression to £53,108 per annum
Line Manager:	Guy Kirk, Professor of Soil Systems
Start date:	As soon as possible

Section 2
About Cranfield University

Cranfield's world-class expertise, large-scale facilities and unrivalled industry partnerships is creating leaders in technology and management globally. Find out more about our unique impact, and our vision, mission and values here.

We aim to create and maintain a culture in which everyone can work and study together and realise their full potential. We are a Disability Confident Employer. We are committed to actively exploring flexible working options for each role and have been ranked in the Top 30 family friendly employers in the UK by the charity Working Families. Find out more about our key commitments to Equality, Diversity and Inclusion and Flexible Working here.

Section 3
About the Faculty of Engineering and Applied Sciences

Cranfield's research and educational excellence is recognised internationally and is brought together in the Faculty of Engineerng and Applied Sciences. The faculty hosts the associated core research and eduction 'Themes' which in turn host a number of world-class centres and institutes. The themes define their own research challenges and educational missions, with the Directors of Theme working closely with the Deputy Vice-Chamcellor (FEAS).

About the Centre for Soil, Agrifood and Biosciences

The Centre for Soil, Agrifood and Biosciences (SABS) is a world-class research centre dedicated to understanding soil, plant, and microbial systems, with the aim of tackling global food and environmental challenges.

We have in-depth strength in soil science, with expertise in fundamental soil biophysics, biology and chemistry (Soil Systems Group) through to applied soil management, soil conservation and ecosystem services (Crop-Soil-Water Systems Group). Our plant and microbial scientists link to our soils research through understanding rhizosphere processes and root trait genetics (Plant Molecular Genetics Group), and we host world-leading groups in postharvest biology (Postharvest Research Group) and in food safety related to mycotoxins and microbiological spoilage (Applied Mycology Group).

We work closely with the Cranfield Environment Centre which is the UK National Reference Centre for soil, and holds national and international soil reference data and samples, publicly accessible through the Land Information System (LandIS) and the World Soil Survey and Archive Catalogue (WOSSAC). In 2017 we won the Queen's Anniversary Prize for our soil research.

Section 4
Job Details

Job Purpose

The post will contribute to the project '**Climate-resilient crops with improved phosphorus efficiency through beneficial fungal interactions**' funded by BBSRC-DFG-NSF. UK Project Lead Prof Guy Kirk (Cranfield U), Co-Lead Prof Uta Paszkowski (U Cambridge); German Project Lead Prof Gabriel Schaaf (U Bonn), Co-Leads Prof Matthias Wissuwa (U Bonn), Prof Peng Yu (Tech U Munich), Dr Martina Ried-Lasi (IPB Halle); US Project Lead Prof Ruairid Sawers (Pennsylvania State U); Project Partner Prof Johannes Postma (FZ Jülich). Dates: October 2025–September 2028 Loading of agricultural soils with phosphorus (P) over many decades has led to widespread contamination of the environment with P, and future crop yields must be sustained with far lower use of P fertilizers. On the other hand, P deficiency is a major constraint to crop yields in countries where fertilizer access is limited. Warmer, drier conditions under climate change will exacerbate these problems because low soil water content greatly reduces the mobility and hence plant-availability of P. Some crop plants are well adapted to growth in low P soils and respond efficiently to modest fertilizer additions. Could such adaptations be exploited to breed crop plants with better P use efficiency and climate resilience more widely? Such adaptations involve mechanisms internal to the plant and external to it allowing more P uptake through the root system, particularly in association with arbuscular mycorrhizal (AM) fungi, which can improve resilience to both water and nutrient stress. We hypothesize that the benefits of AM association will increase in drier future climates. However, how best to exploit this, ultimately in breeding more climate-resilient and resource-efficient crops, is poorly understood.

In this project, we will tackle this question for two contrasting crop plants: upland rice, which exemplifies adaptations to highly weathered, strongly P-sorbing tropical soils with little P fertilizer use, and maize, which typically requires higher soil-P fertility. Rice and maize have contrasting root systems, and potentially contrasting dependencies on AM symbiosis for their P uptake. In previous work, members of the project team have developed lines and mutants of rice and maize with widely differing P use efficiencies and AM associations. We will further develop such lines and use these in lab, controlled environment and field experiments, underpinned by modelling. In the modelling component, we will extend the OpenSimRoot model of P uptake by 3D root systems developed by Project Partner Johannes Postma (https://www.quantitative-plant.org/model/OpenSimRoot) to include P solubilization processes in the rhizosphere using the model of Kuppe et al (https://doi.org/10.1111/pce.14285), and then to allow for the effects of AM fungi including effects on root growth and geometry as well as hyphal uptake of P. We will use the results of our field and controlled-environment experiments to guide the development and testing of the model.

Key Deliverables

	Description of Deliverables	% of time
1	**Research** Contribution of knowledge and understanding of plant and soil sciences and expertise in modelling to help meet the project's modelling objectives as a research team member. Planning and implementation of modelling activities in collaboration with project partners. Management, analysis and interpretation of data. Authoring and submission of academic journal articles to high quality journals for publication and dissemination.	**75%**
2	**Collaboration and presentation** Participation in project meetings and collaboration with project partners in the UK and internationally. Presentation of project findings at national and international scientific meetings.	**20%**
3	**General** Take responsibility for organising resources and effective decision making in support of the research. Carry out other activities as directed by line manager. Ensure that Cranfield's Environmental, Health and Safety policies are adhered to.	**5%**

Please be advised that the percentages allocated for the key deliverables may be adapted to take into account the needs of the Faculty and / or University.

Planning and organising

You must adhere to delivering the research work within the time-scales set by your line manager and required for the broader project, including monthly review meetings with project partners and summary presentations and planning for the next month's schedule.

You will be self-directed and well organised. You should be able to develop a forward research plan for yourself over both short and extended timescales. You should have excellent project and time management skills, ensuring that milestones and deliverables are achieved to time and to high quality. The role will involve short-term responsibilities such as day-to-day project management, interaction with the wider project team and organising project meetings.

Work will need to be clearly documented on a day-to-day basis, showing a clear development path for the project. On an ad-hoc basis you may be required to assist with other related projects where your skills may be relevant.

Communicating and influencing

You will collaborate with other research institutions in the UK, Europe and the US. You will need to be able to demonstrate excellent inter-personal skills to communicate with staff from all organisations across a range of disciplines to discuss project methodologies and to interpret results. You will be expected to be able to articulate information about your work in a clear and concise manner and to discuss problems constructively with your line manager and colleagues. An active and collegiate team mentality is the expected norm at Cranfield.

You will be expected to communicate scientific results effectively through reports and presentations at national and international meetings/conferences, and to prepare articles suitable for publication in high-impact peer-reviewed journals. There will be opportunities to present project outputs at science conferences through oral presentation and a need to be able to actively contribute to workshops, technical meetings and seminars. A confident approach to presentation and delivery is required.

Problem solving

You are expected to already be a confident and independent researcher. You will be expected to be able to work independently for most of the time, with reference to the line manager and other project colleagues for points of clarification.

You will be expected to think through and solve problems which may be encountered in terms of methodology, analyses and development of models and interpretation of results.
Most problems will be solved through experience and through the guidance and mentoring available. You will be expected to discuss problems constructively with the line manager or other colleagues.

You will be responsible for ensuring that appropriate risk assessments are carried out for any new procedures to meet the University specification.

Decision making

I) Decisions you will take without reference to others

- Day-to-day management and planning of on-going research within the overall specifications provided by the project terms of reference / proposal.
- Draft delivery of high quality research and reports to deadline and quality.
- Writing draft journal and conference papers.
- Preparing material for jointly authored papers and conference presentations.
- Active participation in the implementation of health and safety procedures in the areas in which you work.
- Drafting reports, minutes, actions and papers.
- Identifying, collating and communicating associated research papers and reports

II) Decisions you will refer to your manager/colleagues

- Developing new research ideas, proposals, consultancy work and identifying sources of funding.
- Balancing ongoing research commitments, project management and publication/proposal-related activities.
- Activities to enable the dissemination and exploitation of research results.

- Aspects potentially affecting the operation of the project or the outcome of the results, such that they will have influence on the success of the project meeting the goals.
- Budgetary issues related to research contracts.
- Decisions that involve modifications to contracted deliverables.
- Writing journal and conference papers – final submission.
- Research support for PhD and MSc students.

Guiding framework

The guiding framework for this role is the University's Corporate plan – Ambition 2027.
The Faculty supports the University's Corporate Plan which is focused on the application of scientific excellence in a financially viable operating environment.

There are established working practices, processes, systems and procedures that you will learn and must be used. Alterations to any of these must be agreed with the line manager. You can expect close support from the line manager in research, career development, mentoring, project management and publications/proposals.

Our performance and development review scheme provides a set of objectives agreed with the line manager for the year ahead and expected SMART targets.

Duties and responsibilities should be carried out with due regard and compliance with the General Data Protection Regulations, Health and Safety and the Equality Act 2010. All staff must conform to the requirements of the Financial Manual. The role will be subject to normal Faculty and university systems and procedures. A very high emphasis is placed in particular on conformity with health and safety, environmental and ethical policies of the university.

There may be occasions when existing procedures may not cover new circumstances and where you need to work collaboratively with the Head of Department, academic staff and the Department administrators to develop new processes for the future.

Impact

The role will be focused on meeting the aims and objectives of the project.

It is very important to conduct high quality research to maintain and enhance the reputation and performance of the institute and Faculty. This will have impact on colleagues in related areas of research and could facilitate further internal and external collaborations.

No direct responsibility for budget or other staff / students is associated with this role. However, opportunities to co-supervise PhD / MSc students will be provided, and we expect all our post-doctoral researchers to take an active role within the Centre and more widely within the Faculty to both inform others of their on-going work and to make best use of existing knowledge and expertise. There will also be scope to develop linked project bids and to work with colleagues in responding to research calls, as appropriate.

You will be expected to present work at national and international meetings/conferences and to write peer reviewed journal papers.

Section 5
Am I suited to this role?

Criteria	Essential	Desirable
Education / Qualifications	PhD (obtained or near completion) in plant science, soil science or a related field.	
Experience	Research in plant and soil sciences. High level analytical ability. Matheamtical modelling. Basic-level programming (e.g. Python). Publication record commensurate with career stage.	Plant genetics and breeding. Plant adaptations to soil stresses. Rhizosphere research. International research collaboration. Presentation at major national or international conferences. Track record of winning research funding.
Knowledge	Principles and practices of plant and soil sciences.	Health and Safety Legislation as it relates to the role. Broader university management processes. Academic standards in UK higher education sector.
Skills / Aptitudes	Ability to pursue research as part of an interdisciplinary team and to develop collaborations. Project and time management skills, with ability to ensure that milestones and deliverables are achieved to time and to high quality. Oral and written communication skills, and good technical writing skills in English. Team-working and inter-personal skills. Ability to undertake original research. Ability to find appropriate solutions to academic and technical problems.	
Values	Ability to demonstrate our values: Ambition, Impact, Respect and Community.	
Other	The willingness and ability to travel and work overseas with international partners.	