FoodBioSystems DTP Studentships 2024

Applicant Guidance

Project: FBS2024-048-Landahl-cr / Deciphering spatial colonisation and pathogenesis of *Fusarium oxysporum* f. sp. cepae on onions by assessing associated physical and biochemical changes to decrease food loss

Available studentship

Project title: Deciphering the spatial colonisation and pathogenesis of *Fusarium oxysporum* f. sp. *cepae* on onions by assessing associated physical and biochemical changes to decrease food loss.

Supervisors: Dr Sandra Landahl, Cranfield University; Dr Luke Bell, University of Reading; Dr Carol Verheecke-Vaessen Cranfield University; Dr Gianfelice Cinque, Diamond Light Source; and Dr Lembe Magwaza, Cranfield University

The FoodBioSystems Doctoral Training Partnership (DTP) is advertising a four-year fully funded PhD studentship for this project to start no later than 30 November 2024. The studentship will be awarded through a competitive process. The project will be based at Cranfield University, with one year working at Diamond Light Source, Oxfordshire and shorter research visits at University of Reading.

Please note:

- This four-year studentship is available only to individuals who are eligible for UK/home student fees status. We regret that we can not fund international students on this occasion, and we will not process applications from any candidates who require a visa to study in the UK.
- The studentship start date is flexible up until 30 November but for operational reasons can not start after this date.

Timeline for applications and selection

Action	Date
Projects advertised on FoodBioSystems website	Monday 29 July 2024
Online application system opens	Thursday 1 August 2024
Closing date for requesting a mentor (eligible applicants only)	Tuesday 20 August 2024 (09:00 BST)
Closing date for student applications	Monday 9 September 2024 (10:00 BST)
Student interviews (shortlisted candidates will be contacted by project supervisors by 13 September 2024)	20 September 2024
Candidates not shortlisted notified by email	17 September
Award/rejection letters sent to shortlisted applicants	w/c 23 September 2024

Being a FoodBioSystems DTP funded student

You will enrol as a PhD student at Cranfield University and join a cohort of 33 FoodBioSystems DTP students funded who are also undertaking research projects at Cranfield and five other partner universities (Aberystwyth University, Brunel University, Queen's University Belfast, University of Reading and University of Surrey). You will undertake training that leads towards a PhD and equips you with extra skills and knowledge to support your future career. In addition to your research project, you will take part in the FoodBioSystems DTP training programme to gain a core understanding of food systems, data analysis and modelling. You will also follow a programme of subject specific learning, depending on your needs.

Please explore our website to find our more about the DTP training programme and current projects at the six partner universities, and meet some of our researchers to see what they say about their research and training experiences so far.

Student profile:

We are looking for applicants with:

- A background and/or experience in biophysics or biochemistry is desirable, but not mandatory.
- Experience with machine vision or imaging, microscopy or spectroscopy is desirable.
- Skills in either plant biomechanics or microbiology would be appropriate for this project, although training will be made available according to the student's needs.

- An interest in the agrifood sector with the right focus on new bioimaging methodologies would also be an asset.

Stipend (salary)

FoodBioSystems DTP students receive an annual tax-free stipend (salary) which is paid in instalments throughout the year. For 2023/24 this is £19,237 and will increases slightly each year at the rate set by UK Research and Innovation (UKRI). This studentship is co-funded by Diamond Light Source Ltd (Diamond) and attracts a stipend top-up of £2,000 per year. The studentship will also cover tuition fees at the standard UK rate and research project costs.

Academic eligibility

An upper 2nd class honours degree (or equivalent) is required in a subject appropriate to the PhD project applied for (see the project description for more information on project area). Candidates with a lower class of bachelor's degree, but a good performance at master's level (merit or above) will also be considered. If you have an international qualification, please check the degree course eligibility information provided by Cranfield University before you apply to the DTP.

Funding Eligibility

This studentship is available only to individuals who are eligible for UK/home student fees status. To be classed as a home student, candidates must not need a visa to study in the UK and must meet the following criteria:

- be a UK or Irish National (meeting residency requirements), or
- have settled status in the UK (applicants from EU, Switzerland, Norway, Iceland and Liechtenstein only), or
- have pre-settled status in the UK and meet residency requirements (applicants from EU, Switzerland, Norway, Iceland and Liechtenstein only) or
- have indefinite leave to remain or enter.

For further information about eligibility for UK home fees status please see: Eligibility for home fee status and student support in England.

Further funding eligibility information

Funding for PhD studentships from BBSRC is only available to successful candidates who meet the eligibility criteria set out in the UKRI harmonised training conditions. Offers of studentships to successful candidates will be conditional on acceptance onto PhD programmes at the host university.

Language proficiency

Candidates must demonstrate the level of English proficiency required by the university that will be hosting the PhD studentship (the university where the project's lead supervisor works). If you have completed a degree or higher degree in a course that was taught in English, this may be sufficient evidence of your language proficiency Please check the relevant university website, or contact Cranfield University admissions office, for further details.

Equality, diversity and inclusion

The FoodBioSystems DTP is committed to equality, diversity and inclusion (EDI). We want to build a doctoral researcher (DR) and staff body that reflects the diversity of society, and to encourage applications from under-represented and disadvantaged groups.

Applicants with disabilities or specific learning differences

Applicants can choose to disclose a disability or specific learning difference (SpLD) on the application form. The DTP office will contact shortlisted applicants who have made this disclosure so we can offer reasonable adjustments to interviews and in selection panel assessment of written answers. Details of the disability or SpLD are kept confidential unless the applicant chooses to share them with the interview and selection panels.

Guaranteed interview scheme

FoodBioSystems DTP offers a guaranteed interview scheme for candidates from eligible under-represented ethnic groups. This is an opt-in process**.** Applicants can participate in this scheme if they meet the following criteria:

1. Hold UK home student fee status for 2024 entry (details on UK fees status are available from UKCISA)
2. Identify as:
    a. Black, African, Caribbean or Black British
    b. Asian or Asian British
    c. Belonging to mixed or multiple ethnic groups
3. Hold or expect to obtain a minimum of a 2.1 undergraduate degree in a relevant subject, or equivalent qualification

Candidates with a guaranteed interview must also provide full written answers to all questions about research and transferable skills in the application form. Assessment of written answers and interview performance are both considered when awarding studentships (see assessment criteria).

Applicant mentoring scheme

We offer applicants, who meet GIS criteria, an opportunity to apply to our applicant mentoring programme. Applicants who are accepted onto the mentoring programme will receive four mentoring meetings, with a current DTP student with mentor training, during the application process.

- **Meeting one:** (between 22 and 29 August 2024) A brief pre-application discussion with the mentor
- **Meeting two:** (between 27 August and 3 September 2024) An application writing support session
- **Meeting three:** (between 3 and 10 September) An interview preparation session
- **Meeting four:** (after 23 September 2024) A post application outcome reflection session

To be eligible to receive mentoring, applicants must:

- Identify as:
    - Black, African, Caribbean or Black British
    - Asian or Asian British
    - Belonging to mixed or multiple ethnic groups
- Hold or expect to obtain a minimum of a 2.1 undergraduate degree in a relevant subject, or equivalent qualification
- Hold UK home student fee status for 2024 entry (details on UK fees status are available from UKCISA)

Priority will be given to applicants who meet the above criteria and also identify with one of the following:

- Have ever been in receipt of free school meals
- Are the first in their family to attend higher education
- Have completed/are completing their undergraduate studies at a non-Russell Group university

How to request a mentor

If you are eligible to apply to the guaranteed interview scheme and would like to meet with a mentor, please complete the following sections of the online application form (before 09.00 (BST) on Tuesday 20 August 2024)

- Personal details
- Education history (and upload transcripts / degree certificates)
- Equality diversity and inclusion

Please do not request a mentor after the closing date for this scheme (09.00 (BST) on Tuesday 20 August 2024). **We will not be able to assign you a mentor after this date.**

If you are eligible for the scheme, we will contact you shortly after 21 August with details of your proposed mentor. Please note: We will only share your name and email address with mentors. Other personal information will be kept confidential and used by the DTP office if we need to prioritise applications according to the eligibility scheme criteria.

Part-time registration

In addition to full-time registration, our studentships are offered on a part-time basis. The minimum registration is 50% FT, and the studentship end date will be extended to reflect the part-time registration. We recommend that if part-time studentships are combined with paid employment, the combined time commitment does not exceed 40 hours per week.

How to apply

ALL applications to FoodBioSystems DTP are made via the online application form, project details are available at the end of this document. The project description indicates the name and institution of the lead supervisor and has a project ID number. You are welcome and encouraged to email the lead supervisors to ask them any questions you may have or to discuss the project.

You will need the following documents to support your application:

- Official transcripts of your higher education qualifications, inclusive of grades
- Evidence of your proficiency in English if English is not your first language. (You can provide this later if you have not completed an IELTS test before the application closing date).

You must also provide the name and email address of someone who will provide a confidential academic reference. The DTP office will request the reference from your referee if you are shortlisted for interview.

Application closing date

Applications must be submitted via the online application form by 10.00 am (GMT) on Monday 9 September 2024.

How we select students

Applications received before the closing date and time are considered in two stages:

Shortlisting

Applications are checked for academic and funding eligibility. Eligible applications are anonymised and then considered by the PhD project supervisors. They mark the application answers against the assessment criteria. At this stage supervisors do not know the name, contact details or degree-awarding university of applicants. The four highest scoring candidates for each project will be invited to interview.

Interviews and selection panel assessment

Interviews

If your application is shortlisted you will receive an invitation to an online interview (on Skype, Teams or Zoom). As part of the interview, you will be asked to give a short research presentation (maximum five minutes) followed by five minutes for questions about the presentation. During the remainder of the interview, additional questions will explore:

- Your motivation to do a PhD with the FoodBioSystems DTP
- How your skills and experience prepare you for the specific project
- Other questions about impact of the research, problem solving skills and career plans

Selection panel assessment

If you are selected for an interview, a panel of reviewers from the DTP Selection Committee will also assess the written answers from your application form. They will not know your name, contact details or degree-awarding university at this stage.

Assessment criteria

We ask applicants to provide information about their academic qualifications, research experience and transferable skills. It is essential that all applicants (including those applying for a guaranteed interview) provide full answers in their written application, as these are assessed at least once during the selection process.

The table below shows what essential criteria the DTP is looking for in our PhD student candidates and where in the selection process we assess those criteria.

Essential Selection Criteria	Stage Assessed		
	Shortlisting	Interview	Selection Panel review of application form answers
Academic qualifications and background	x	x	
Academic and technical understanding of the research topic presented during the interview		x	
Project specific research experience and technical skills	x	x	
General research experience and technical skills	x		x
Ability to relate own skills to the proposed PhD project		x	
Transferable skills	x	x	x
Understanding of the UK agri-food sector	x	x	x
Motivation for choosing the FoodBioSystems DTP		x	x
Awareness of how this PhD fits into own career plans	x	x	

The selection panel will make the final decision on project allocation, considering applicants' performance at interview and reviewer assessments of written answers.

Previous applicant success rates

Success rates for home and international student applicants to the DTP (2021-24) are outlined below:

Cohort	Number of international student applicants	% international applicants awarded a studentship	Number of home student applicants	% home student applicants awarded a studentship
2020	n/a	n/a	125	24%
2021	467	1.3%	148	13.5%
2022	501	1.4%	86	23%
2023	774	0.9%	90	26%
2024	1176	0.9%	86	26%

Since 2021, the DTP can allocate a maximum of 30% of its funding to international students each. We have recruited the maximum number of international students in 2024 so this project is available to home student applicants only.

Project details

Project title: Deciphering spatial colonisation and pathogenesis of *Fusarium oxysporum* f. sp. cepae on onions by assessing associated physical and biochemical changes to decrease food loss

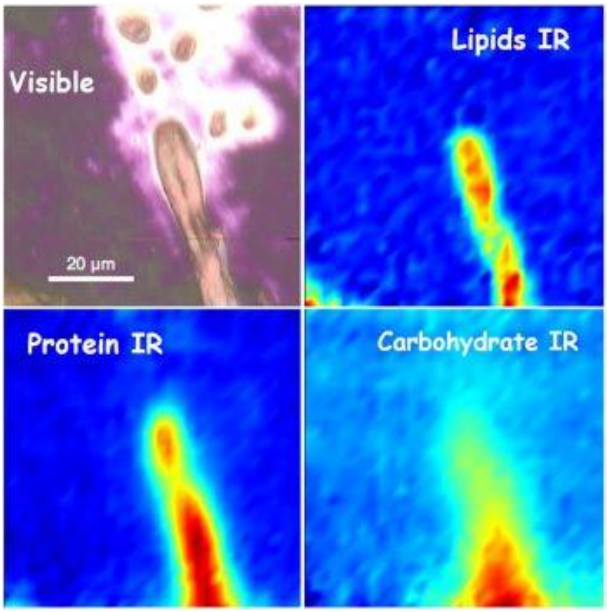
Project No: FBS2024-048-Landahl-cr
Lead supervisor: Dr Sandra Landahl, Soils, Agrifood and Biosciences, Plant Science Laboratory, Cranfield University (s.landahl@cranfield.ac.uk)
Co-supervisors: Dr Luke Bell, University of Reading (luke.bell@reading.ac.uk); Dr Carol Verheecke-Vaessen, Cranfield University;
Dr Gianfelice Cinque, Diamond Light Source; and Dr Lembe Magwaza, Cranfield University

Project description:

How do the host onion plant and pathogenic fungus (*Fusarium*) interact at different stages of development?

The resilience of the onion plant to *Fusarium* is critically related to specific stages in its development. Advanced imaging of the *Fusarium*–onion interaction at different wavelengths – X-ray, visible and infrared (IR) – from growth through to the postharvest period, combined with an analysis of the onion's nutrients will elucidate the process of virulence. In the proposed study, the biochemical responses of the plant at each developmental stage will be correlated with those of the fungus.

Key objectives: The aim of this project is to decipher the spatial colonisation and pathogenesis of *F. oxysporum* f. sp. *cepae* on onions by assessing the physical and biochemical changes that take place during bulb growth in response to the disease. This knowledge is essential for early disease detection, crop health assessment and the establishment of effective crop-storage management strategies to reduce food losses and minimise further disease spread in onion production.



Cutting-edge research methods: A series of state-of-the-art imaging techniques will be examined and evaluated in order to study the interaction between *Fusarium* and onions.

Optical coherence tomography (OCT) is a non-contact, real-time technique suitable for assessing the near-surface internal structure of plant tissue. It has been used to visualise the shape and size of plant cells at different tissue boundaries.
Collaborative relationships with the photonics group at Cranfield University provide access to a commercial OCT system.

X-ray computed tomography scanning, which affords a convenient means of non-destructively recording the external and internal structures of seeds and fruits, offers the potential to compile data on their three-dimensional characteristics and internal morphologies.

At DLS, molecular microanalysis via Fourier Transform IR (FTIR) micro-spectroscopy using either synchrotron radiation in quasi confocal mode (to enable the highest spatial resolution at the sub-cellular scale) or focal plane array imaging in full field mode (for a broad field of view) are both envisaged for fresh/live bio-sample analysis. FTIR nano-spectroscopy may be considered at the 100-nm level for a subcellular analysis of the pathogen.

At University of Reading, the student will have the opportunity to acquire advanced volatile organic compound collection and analysis techniques. Samples will be analysed using two-dimensional gas chromatography mass spectrometry, a powerful technique for identifying molecular markers of infection and understanding the biological processes underlying plant infection and immune response.

At Cranfield University there will be access to glasshouses and the institution's Environmental Analytical Facility.

Professional collaboration and training opportunities

The student will have access to multi-disciplinary learning and research along with the expertise of professional working groups at the collaborating universities and Diamond Light Source (DLS) in the fields of plant husbandry, imaging, mycology, mass spectrometry and structural biology for an integrated approach.

At Cranfield University, the student will be a member of two groups:

- The Plant Science Laboratory, with expertise in plant ecophysiology, postharvest technology, non-destructive testing, biochemistry and plant biomechanics.
- The Applied Mycology Group, with expertise in fungal ecology, ecophysiology, analytical chemistry and molecular biology.

At DLS, the student will be a member of the IR beamline group where:

- The Multimode InfraRed Imaging and Microspectroscopy beamline, B22, a leading research method for hyperspectral bioimaging at the cellular and subcellular scales, can be learned and applied.
- Chemometrics training will be available for hyperspectral imaging and vibrational micro/nano-spectroscopy.

At University of Reading, the student will learn and apply the following:

- Two-dimensional gas chromatography time-of-flight mass spectrometry as an advanced approach for untargeted analysis of volatile organic compounds (VOCs) in foodstuffs.
- Temporal monitoring of VOC emissions from bulbs during storage as well as consumer-focused traits related to flavour. University of Reading has an established record in the analysis of food composition and flavour and has recently expanded its mass spectrometry and other analytical techniques' capability.

In addition to completing training delivered by the FoodBioSystems DTP, the student will be able to attend MSc course modules at Cranfield University in: applied bioinformatics, food systems and management, and future food sustainability courses, providing excellent background knowledge on data analysis, programming, food diagnostics, food mycology and the food security agenda. The student will also attend training from Cranfield University's Doctoral Researchers' Core Development programme in topics such as project and time management, scientific writing skills, statistics and data management, and presentation skills.

At DLS, there will be world-leading training in IR microscopy and imaging with comprehensive data analysis, utilising machine-learning classification tools for hyperspectral imaging. The student will develop expertise in high resolution imaging and microanalysis, including sample preparation.

The student will additionally undertake placements at an onion growers' association, to familiarise themselves with relevant industrial standards and practices, and University of Reading

Contacts

If you have any questions about the application and selection process that are not answered by this document, please contact the DTP office.

Please contact Dr Sandra Landahl or Dr Luke Bell if you have any questions about the project.

V1 31/07/2024