

PhD Project Advertisement

Project title: Walk on the Wild Side: improving trait introgression from crop wild relatives.

Project No: FBS2023-34-Lloyd-ac

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Co-supervisors:

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Project description:

To sustainably meet society's future food needs we will need crop varieties equipped to meet a new set of environmental challenges and emerging diseases. A powerful resource to help meet this challenge are the many beneficial traits found in landraces and wild relatives of crops. Much of this important biodiversity has been collected and is housed in repositories such as the Svalbard Global Seed Vault and the AberInnovation Seed BioBank at Aberystwyth University but introducing these beneficial "wild traits" into crops remains a challenge, often taking many years of pre-breeding before traits can enter conventional breeding programmes. This project addresses two of the major challenges to trait introgression – What limits introgression? And when it occurs, how do we find out what has been introgressed? Introgression requires the exchange of genetic material between chromosomes of the donor crop-relative and those of the recipient cultivated crop. This exchange occurs via "meiotic recombination" which is limited between chromosomes originating from different species. Based at the University of Aberystwyth, the student will use CRISPR/Cas9 gene editing to determine the role of key meiosis proteins in suppressing inter-specific recombination. The student will learn cutting edge plant biotechnology, molecular and cell biology and super-resolution fluorescence microscopy techniques and work closely with plant breeders based in Aberystwyth.

The student will also spend time at Cranfield University working with experts in bioinformatics to develop software that can help plant breeders and pre-breeders efficiently characterise introgressions to find out which wild gene variants have been introduced and which lines to use for future breeding programmes. This software will be put to use in collaboration with breeders at commercial partner Germinal, a plant breeding company with a base in Aberystwyth, where it will be used to characterise clover introgression lines for use in Germinal's white clover breeding programme.

Training opportunities:

This project offers multidisciplinary training in molecular plant genetics, biotechnology, bioinformatics and plant breeding, equipping you for a successful research career in range of scientific disciplines either in academia or industry. There is strong demand for researchers with the combination of wet-lab and bioinformatics training, and for researchers with industry links and experience. As such, this PhD will see you very well placed for the post-doctoral job market.

You will receive advanced training in advanced molecular genetics and biotechnology at Aberystwyth University and bioinformatics pipeline development at Cranfield University. You will also undertake a number of post-graduate courses at Aberystwyth and Cranfield during the programme, helping develop a wide set of applied and transferrable skills. During the PhD you will also undertake a three-month placement in the plant breeding company Germinal, receiving training in hybrid production and many other aspects of breeding science.

You will be conducting research with real-world impact, developing new transformative tools and resources to advance crop development, benefitting from a fantastic team of supervisors and collaborators with diverse backgrounds and expertise. You will also have the opportunity to showcase your research to the scientific community with funding provided to attend national and international conferences.

Student profile:

This project would be ideal for a student with an interest in both wet-lab science and bioinformatics with a degree in biology, computer science or a related area. Prior laboratory experience in genetics and molecular biology as well as bioinformatics is desirable, though not essential. We are looking for an individual with a genuine interest in understanding fundamental science and translating this understanding into applied outcomes for crop development.

Stipend (Salary):

FoodBioSystems DTP students receive an annual tax-free stipend (salary) that is paid in instalments throughout the year. For 2022/23 this will be £17,668 and this will increase slightly each year at rate set by UKRI.

Equality Diversity and Inclusion:

The FoodBioSystems DTP is committed to equality, 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](#).

In accordance with UKRI guidelines, 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.

References:

Gramazio, P., Prohens, J., Toppino, L. and Plazas, M. (2021) Editorial: Introgression Breeding in Cultivated Plants. *Front. Plant Sci.*, 12, 764533.

Bozdag, G.O., Ono, J., Denton, J.A., Karakoc, E., Hunter, N., Leu, J.Y. and Greig, D. (2021) Breaking a species barrier by enabling hybrid recombination. *Curr. Biol.*, 31, R180–R181.

Schneeberger, K. (2014) Using next-generation sequencing to isolate mutant genes from forward genetic screens. *Nat. Rev. Genet.*, 15, 662–676.

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