FoodBioSystems DTP - PhD Project Advertisement Text

Project Title: FOODBIOSYSTEMS - Understanding the role of glucosinolates and volatile organic compounds in resistance to aphid (Myzus persicae) infestations on Brassica oleracea crops

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Research Group: FOODBIOSYSTEMS BBSRC DTP
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Application Deadline: 6 March 2020

Project Description: Brassica oleracea vegetables (such as broccoli & cabbage) are important horticultural crops, the consumption of which have been reported to confer numerous properties beneficial to human health. Production is under threat due to the withdrawal of pesticides in recent years. Combined with the evolution of insecticide resistance by key pests, growers have far fewer options for the effective control of aphids (Myzus persicae; the green peach aphid).

Myzus persicae is a generalist pest that can cause significant damage and yield loss in B. oleracea varieties. They act as vectors, transmitting viruses between plants, which can further threaten production. Their piercing mouth-parts produce wounds into which other external pathogens may enter. Breeders and growers are in need of new sources of partial resistance to these pests, and understanding the role plants' own chemical defenses play in this is fundamental to reducing future crop losses.

The successful student will investigate partial resistance to aphids within broccoli and cabbage varieties. Specifically, glucosinolate (GSLs) compounds and the degradation products they produce upon tissue damage by pests will be analysed in detail. They will also study the volatile organic chemicals (VOCs) released by plants, to see how these signals influence aphid preference and growth rates on Brassica plants. There are complex interactions that exist between plants and aphids, and this will be a unique opportunity to work with experts in their fields, and gain access to state-of-the-art facilities and equipment at the University of Reading and Cranfield University.

The applicant will use highly interdisciplinary techniques to uncover the mechanism(s)/molecule(s) of action responsible for partial resistance of Brassicas to aphids. Techniques such as gas chromatography mass spectrometry will be used for the analysis of volatiles; and electroantennography for determining which chemical compounds insects can detect from plants, will be utilized extensively. Next generation sequencing will be used to find genes linked with aphid resistance and behavior. The student will also learn important concepts involved with Brassica cultivation and plant breeding methods.

This is an exciting area of research that will have tangible benefits for plant breeders and growers.

Funding Notes: This project is part of the FoodBioSystems BBSRC Doctoral Training Partnership (DTP), it will be funded subject to a competition to identify the strongest applicants. Due to restrictions on the funding, this studentship is only open to UK students and EU students who have lived in the UK for the past three years.

The FoodBioSystems DTP is a collaboration between the University of Reading, Cranfield University, Queen's University Belfast, Aberystwyth University, Surrey University and Brunel University London. Our vision is to develop the next generation of highly skilled UK Agri-Food bioscientists with expertise spanning the entire food value chain. We have over 60 Associate and Affiliate partners. To find out more about us and the training programme we offer all our postgraduate researchers please visit https://research.reading.ac.uk/foodbiosystems/.

Training opportunities: The student will receive world-class training in several diverse disciplines. At the University of Reading School of Agriculture, they will utilize and be trained in insect rearing and electroantennography. Training in molecular biology, genetics, and gas-chromatography mass spectrometry will be provided at Reading, as well as bioinformatics and liquid chromatography mass spectrometry at Cranfield University.

Student profile: This project would be suitable for a student with a BSc (2:1) and/or MSc in plant science, agriculture, genetics, bioinformatics, food and nutritional science, or any related degree subject. Good communication, writing, organizational, and critical thinking skills will be essential. Previous work experience in the horticulture/agriculture sectors would be desirable but not required. A strong interest in plant biology, entomology, computing, or genetics would also be beneficial.