University of Adelaide-University of Nottingham Joint Doctoral Training Partnership

Applications are invited for fully funded 4-year PhD studentships in the Joint Doctoral Training Partnership between the Universities of Adelaide and Nottingham. This innovative doctoral training programme aims to address key issues associated with agricultural sciences and with innovation in the food and beverage industries. The student cohort will be co-supervised by staff at both universities and will undertake a minimum period of research of one year at each institution. The Adelaide-Nottingham Doctoral Scholars, will be primarily based on the Waite Campus in Adelaide or on the Sutton Bonington campus in Nottingham. Both campuses are renowned for their world-leading research in agricultural, food and beverage sciences, and their outstanding facilities for research and teaching. PhD graduates will obtain jointly awarded degrees from the University of Adelaide and the University of Nottingham. The studentships will cover PhD tuition fees, plus a stipend corresponding to the standard research council rates of both countries. The following projects are available to start early in 2017.

Eligibility: All students should have, or expect to obtain, a first-class or good 2:1/2A honours degree and/or a high distinction, distinction or high merit at the Masters level in a biologically related subject area.

Apply: Please select the specific project that you wish to apply for, then apply online by sending your cv and unofficial transcripts to the principal project supervisor (see project details). Please provide a covering letter to indicate your interests and why you are applying to the "Joint Nottingham-Adelaide Programme".

Informal enquiries may be addressed to the individual project supervisors or to SB-Research@exmail.nottingham.ac.uk

1. *Plantago ovata* (psyllium gum) grown for designed food structure-functionality traits - Supervision by Rachel Burton (UA), Tim Foster (UN), Helen Collins (UA) and Stephen Harding (UN)

In Adelaide, the PhD student would join a team of researchers at the Australian Research Council Centre of Excellence in Plant Cell Walls in research to exploit genetic variation among and within *Plantago* species and within a gamma-irradiated *P. ovata* population. The seed mucilage can be screened for many interesting properties, including those related to dispersal, digestibility, stickiness and solubility. Such properties are related to backbone and side-chain composition, length, substitution and molecular interactions of the composite polysaccharides. The causative mutations and allelic diversity controlling these properties can be defined using genomic and transcriptomic tools, facilitating potential reverse genetics approaches to "designer" mucilages using genetic transformation of *P. major*. At Nottingham, the student will evaluate the impact of these changes on: physical properties of molecular solutions/dispersions, processability of model food

systems, end-product properties/quality and human health through control of digestion attributes such as lipid digestion glycemic response and fermentability. **(Contacts:-rachel.burton@adelaide.edu.au; Tim.Foster@nottingham.ac.uk)**

2. The *CreR* cereal cyst nematode resistance locus of rye: introgression into wheat and isolation of the causal gene - Supervision by Diane Mather (UA), Julie King (UN), Ian Dundas (UA) and Ian King (UN)

The *CreR* locus, which has been introgressed from rye into wheat, confers near-immunity to the cereal cyst nematode (CCN) *Heterodera avenae*. The objectives of this project are to: (1) estimate the position of *CreR* on rye chromosome 6R; (2) isolate the causal gene for C*reR* and determine how it confers resistance against CCN; (3) transfer *CreR* onto a small introgression segment for use in wheat breeding. In addressing these objectives, a PhD student will be trained in molecular cytogenetics (in Nottingham), molecular plant breeding (in Adelaide) and plant protection (in Adelaide). At both universities, the student will interact with others working on chromosome engineering of wheat. In Nottingham, the student will have the opportunity to do root imaging. In Adelaide, the student will interact with others working to isolate nematode resistance genes from cereals and to understand plant-nematode interactions. The student will use unique and complementary genetic resources developed at the two universities, with Adelaide near-isogenic lines providing the key for gene isolation and Nottingham wheat-rye introgression lines providing the key for transferring *CreR* onto a small introgression segment. **(Contacts:-diane.mather@adelaide.edu.au; Julie King: sbzjk@exmail.nottingham.ac.uk)**

3. Untangling and harnessing interactions between natural enemies of vineyard pests - Supervision by Ian Hardy (UN), Maryam Yazdani (UA), Helen West (UN) and Mike Keller (UA)

Successful biocontrol of insect pests requires understanding of interspecific interactions within agro-ecosystems. In this project, the student will focus on interactions between natural enemies of the light brown apple moth (LBMA, *Epiphyas postvittana*) in Australian vineyards. These enemies include predatory mites and the parasitoids *Dolichogenidea tasmanica*, *Therophilus unimaculatus* and *Goniozus jacintae*. In Adelaide, the student will carry out agri-field (relatively holistic) and laboratory (relatively reductionist) research to evaluate the frequency of interactions and their longer-term consequences for pest suppression. In Nottingham, the student will use laboratory microcosms and behavioural observations to identify direct and indirect competition, facilitation and interference interactions (mutual interference, competitive exclusion). The ultimate goals are to establish which combination of natural enemies (species and seasonal timing of abundance) provides the most effective biocontrol that can be promoted to growers and biocontrol practitioners. **(Contacts:-Ian Hardy: sbzich@exmail.nottingham.ac.uk; maryam.yazdani@adelaide.edu.au)**

4. Understanding the perception of body in alcoholic drinks - Supervision by Rebecca Ford (UN), Sue Bastian (UA) and Kerry Wilkinson (UA)

Body is a term used by consumers and technical experts to describe the viscous mouthfeel of alcoholic drinks. Evidence suggests the perception of body is more complex, encompassing both chemosensory and mechanosensory properties (Runnebaum et al 2011). There are gaps in the literature regarding the impact of aroma and interactions with other components, such as sugar, alcohol and carbonation, on the perceived body of alcoholic drinks. This project will take a scientifically-controlled approach to: (1) explore consumer language regarding body in alcoholic drinks (Adelaide); (2) understand the sensory attributes and compositional factors contributing to the perception, of body in beer and wine using trained sensory panels (Adelaide and Nottingham): (3) investigate consumer perception of body and acceptability of beers and wines manufactured to include compositional factors contributing to body, as directed by previous sensory studies (Nottingham); and (4) investigate individual variations, such as the thermal taster phenotype on the perception of mouthfeel characteristics of wine and beer (Nottingham). Combining consumer data, at both the global and segmented level (based on taster status), with sensory data will enable investigation of the impact of ethanol, sugar, carbonation, phenolics, aroma compounds and interactions on consumer perception of body and liking.

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