

Are you up for the challenge?

SCHOLARSHIP OPPORTUNITY AT THE UNIVERSITY OF MELBOURNE

The Australian Grains Pest Innovation Program (AGPIP) is offering 4 fully funded PhD or MPhil scholarships for students interested in cutting-edge science, environmental sustainability and agricultural innovation.

AGPIP aims to improve the sustainability of invertebrate pest management practices among Australian grain growers through the development of novel technologies, improved insecticide resistance forecasting and management options, development of chemical and beneficial insect stewardship resources and high impact extension material.

Students working under the AGPIP program can expect:

- Research with real world impact
- \$30,000 annual stipend (tax free)
- \$10,000 annually for project operational and travel costs
- Innovative and cutting-edge science
- Access to state-of-the-art laboratories and equipment
- Working collaboratively with industry
- Exposure to variety of research areas and activities
- Studying at an internationally ranked university
- Supervision by world leading researchers

You will be working in a collaborative team at the University of Melbourne under the supervision of renowned Laureate Professor Ary Hoffmann, Associate Professor Paul Umina, Dr Jessica Lye, Dr James Maino, Dr Perran Stott-Ross, Dr Qiong Yang, Dr Xinyue Gu and other notable researchers.

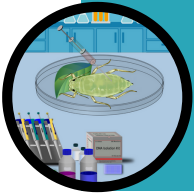
Are you up for the challenge?

SCHOLARSHIP OPPORTUNITY AT THE UNIVERSITY OF MELBOURNE

You will have the opportunity to select from a number of different research topics and speciality areas, including:

- Interactions between symbionts and virus transmission for agricultural pest control;
- A genetic investigation of bacterial symbionts in vector aphids;
- Manipulating bacterial symbionts in aphids for improved pest control;
- Exploring interactions between symbionts and parasitoid wasps;
- Investigating the real costs of neonicotinoids in Australian agriculture;
- Predicting migration cues in aphids;
- Exploring the role of plant stress in pest outbreaks
- Investigating the role of knowledge types in pest management decision-making; and
- Exploration of the environmental factors influencing knowledge transfer.

For more information or to apply for a scholarship position, email the Pest & Environmental Adaptation Research Group at the University of Melbourne (pearg-queries@unimelb.edu.au).



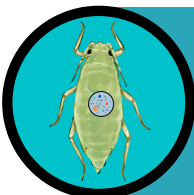
Interactions between symbionts and virus transmission for agricultural pest control

Project Topic

This project will involve testing the presence of symbionts as well as viruses in field populations of aphids, investigating interactions between symbiont communities and virus transmission. By manipulating aphid lines through antibiotic treatment and microinjection in the laboratory, the student will identify endosymbionts involved in suppressing or enhancing plant virus transmission. Our goal is to develop sustainable approaches to pest control without the need for insecticides.

Possible Project Activities

- Insect collection and fieldwork
- Species identification
- Insect rearing
- Experimental design
- Microinjection
- DNA and RNA extraction
- Quantitative PCR



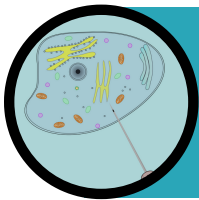
A genetic investigation of bacterial symbionts in vector aphids

Project Topic

This project will involve examining the genetic interaction between bacterial symbionts and vector aphid clones with different efficiency of virus transmission. Our goal is to increase the genetic database on bacterial symbionts in aphids, such as *Buchnera*, *Serratia* and *Rickettsiella* and provide deeper insights into the coevolutionary process between these symbionts and their aphid hosts' capacity of virus transmission.

Possible Project Activities

- Insect collection and fieldwork
- Species identification
- Insect rearing
- Experimental design
- Microinjection
- DNA and RNA extraction
- Quantitative PCR
- Bioinformatics



Manipulating bacterial symbionts in aphids for improved pest control

Project Topic

Bacterial symbionts can have profound effects on aphid biology. This project will involve manipulating endosymbionts through antibiotic treatment and microinjection of symbionts from other aphid species. The student will then test the effects of different symbionts on host biology, including resistance to pesticides. This will help to identify aphid strains or treatments that can reduce crop yield losses by aphids.

Possible Project Activities

- Plant and insect rearing
- Experimental design
- Bioassays
- Microinjection
- DNA and RNA extraction
- Quantitative PCR



Exploring interactions between symbionts and parasitoid wasps

Project Topic

This project will involve collecting parasitoid wasps from the field and laboratory aphid clones and investigating the effect of symbionts within aphid hosts on parasitism as well as interactions between host symbionts and parasitoid. Our goal is to develop sustainable approaches to pest control without the need for insecticides.

Possible Project Activities

- Insect collection and fieldwork
- Species identification
- Insect rearing and experiments
- Experimental design
- Microinjection
- DNA and RNA extraction
- Quantitative PCR
- Bioinformatics for metabarcoding



Understanding the real costs of neonicotinoids in Australian agriculture

Project Topic

Neonicotinoids have rapidly become the most widely used class of insecticides globally. Within Australia, neonicotinoids are now commonplace in many agricultural industries, providing numerous benefits to farmers. However, neonicotinoids can negatively affect the health of soils, and disrupt natural communities of ants and other insects that play an important role in agricultural ecosystems. Moreover, indiscriminate use of these chemicals is potentially costing farmers unnecessary expenses. This project will combine field-based trials, laboratory experimentation and economic analysis to understand the true costs of neonicotinoids on soil biology, invertebrate communities and farmer profitability in the Australian grains system.

Possible Project Activities

- Field-based trial work
- Laboratory experimentation
- Economic analysis & modelling
- Development of predictive models



Predicting migration cues in aphids

Project Topic

Aphid alates are a life stage adapted to sexual reproduction and dispersal. A range of triggers may explain migration in crop aphids ranging from plant phenology to climatic cues. This project would review current knowledge of aphid migration, and conduct experiment or collect field observations to improve our capacity to predict aphid flights.

Possible Project Activities

- Field-based collections and observational work
- Literature reviews
- Environmental and ecological analysis
- Development of predictive models



Exploring the role of plant stress in pest outbreaks

Project Topic

It has historically been difficult to predict the timing of pest outbreaks. One reason for this may be insufficient attention paid to host plant processes and their response to environmental conditions (such as climate and nutrient levels). This project would aim to explore whether or not plant stress offers a window into better predictions of pest outbreaks.

Possible Project Activities

- Field-based collections and observational work
- Literature reviews
- Laboratory experimentation
- Development of predictive models



Investigating the role of knowledge types in pest management decision-making

Project Topic

The current trend towards funding agricultural research for short timeframes and the withdrawal of government funding over the past three decades has led to a steady deterioration in the use and appreciation of sophisticated extension techniques. Often, projects are not undertaken for a sufficient timeframe to allow for an adequate assessment of project impact by extension professionals. This project will undertake a systematic investigation of extension activity impacts and map effective approaches to creating lasting adoption of practices.

Possible Project Activities

- Systematic evidence mapping
- Farmer interviews
- Development of pilot strategies and case studies



Exploration of the environmental factors influencing knowledge transfer

Project Topic

The size of a farming operation, the method of management in use on farms, and the characteristics of a growing region, are likely to have a significant impact on pest management decision making and thus, farm profitability. It has been shown that farms with university level graduates on staff achieve higher than average yields. Using regional case studies, this research project will investigate the environmental factors that influence farming communities and the impact of these factors on knowledge transfer and interest in engaging new pest management methods.

Possible Project Activities

- Literature review
- Economic & environmental data analysis
- Farmer interviews
- Development of regional case studies
- Development of a knowledge transfer model