WESTERN SYDNEY
UNIVERSITY

Hawkesbury Institute
for the Environment

RESEARCH CAPABILITY

Safeguarding Pollinators & their Services

Protecting the future of our crops
and native species

Acknowledgement

Western Sydney University acknowledges the peoples of the Darug, Tharawal, Eora and Wiradjuri nations. We acknowledge that the teaching, learning and research undertaken across our campuses continues the teaching, learning and research that has occurred on these lands for tens of thousands of years.

Researchers

To contact HIE Plants, Animals and Interactions Theme scientists, please go to:
www.westernsydney.edu.au/hie/research/plants,_animals_and_interactions

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Ecosystem components

We rely on pollinators to maintain terrestrial biodiversity and agricultural production. By assisting plant reproduction, pollinators provide an ecosystem service without which, the maintenance of our main food sources, ecosystems and economies are at risk.

Environmental changes, both natural and anthropogenic, threaten the function and resilience of these animal pollinators, of which most are insects.

Significant declines in insect pollinator populations are globally prevalent. More information about pollinator biology, behaviour and how human activities affect pollinators is needed to design policies and support conservation actions to ensure their persistency and protection.

Most animal pollinators of agricultural importance are insects

About 90% of the world's flowering plants depend upon animal pollination

40% of the world's invertebrate pollinators are at risk of extinction

Pollinator declines occur due to pesticide usage, diseases, habitat loss and fragmentation

Pollinator loss is connected with up to 85% drop in production of some major crop species

Innovative research to ensure the productivity of crops & natural ecosytems

Our pollination research focuses on understanding insect pollinator biology, ecology, and the impact of climate change and human activities on their health and behaviour.

Researchers at the Institute are interested in unveiling the symbiotic relationships that can safeguard the productivity of crops and natural ecosystems.

Main research topics

Alternative pollinators

Characterising alternative native pollinators for Australian crops and native plants

Coevolution

Coevolution of native Australian obligate pollinators and plants

Pests & parasites

Identifying new pests, parasites and pathogens in Australian orchard pollinators

Floral resources

Increase pollinator efficiency by improving available floral resources

Climate change

Assessing impacts of climate change on pollinators

Crop data analysis

Crop and varietal data to better understand the importance of pollination

Blue-banded bees

Investigating blue-banded bees as managed buzz pollinators

Bushfire effects

Assessment of bushfire effects on wild pollinators to support bushfire recovery for growers

Stingless bees

Introducing stingless bees as alternative pollinators

Climate impacts

Impact of changes in floral resources on pollinators in the face of climate change

Management strategies

Developing new management strategies for pollinator pests and pathogens

RESEARCH DIRECTIONS

Pollinator viruses

Australia is currently one of the last remaining countries in the world still free of parasitic Varroa mites, which magnify the damage from a common virus in honey bees, Deformed Wing Virus (DWV).

Australia's native bee species contribute significantly to pollination of crops and native plants. Our researchers have assessed virus prevalence in native species to provide insights into the current state of native and exotic pollinators, and prepare for a future where European Honey Bees might be adversely affected by viruses or pests.

Deformed Wing Virus (DWV) is the most common virus found in honey bees, resulting in mass deaths of bee colonies, and estimated to be found in about half of all honey bee colonies globally.

Once a fairly minor honey bee virus, a rise in Varroa infestation has seen DWV spread across the world, highlighting the importance of Australia's biosecurity. Also of concern is the increasing evidence that viruses like DWV can also be carried by a much wider variety of invertebrates than just honey bees.

RESEARCH DIRECTIONS

An alternative pollinator for protected cropping

Our researchers are investigating the effectiveness of alternative pollinators in different crops, and finding better ways to propagate and deploy them. We are working with stingless bees, which live in colonies (like honey bees), pollinate a wide variety of plants, and can be kept in managed hives. These bees are already being used in macadamia farms, where they outperform honey bees.

RESEARCH DIRECTIONS

Native buzz pollinators

We are developing a range of management techniques that will enhance the potential for the use of blue-banded bees as alternative pollinators in commercial greenhouses. Our researchers are conducting research to overcome current limitations in the use of blue-banded bees in greenhouses, reviewing common diseases of blue-banded bees and trialling control methods, and developing procedures for mass rearing.

RESEARCH DIRECTIONS

Future food security following an extreme climate event

Natural disasters such as the 2019 bushfires have allowed our researchers to take stock of the loss of wild pollinator communities and determine the pollination services they provide. This research can further be extrapolated to understand the value of wild pollinators to horticulture and enable growers to better understand their reliance on wild pollinators, and the potential impact of predators and disease on their pollination security.

RESEARCH DIRECTIONS

Creative ways to secure our food supply

Our researchers are targeting fly species to determine their pollinator effectiveness in avocado, berries, hybrid carrot seeds and brassica seed crops. The advantages are that different species of flies are present all year round, they have high sugar demand and visit flowers for nectar, and they are hairy, and hence pick up and move pollen. In addition, some can be readily mass reared with reasonably minimal inputs.

RESEARCH DIRECTIONS

Managing pests & disease

Our researchers are investigating pests and pathogens that reduce the health and fitness of honey bees, as well as their performance in pollination. We are testing the efficacy of a large set of recently isolated entomopathogenic nematodes as biological control agents against two major pests of honeybees in Australia, the small hive beetle and wax moth, and aim to develop novel biological control options for honey bee pests.

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We invite researchers and investors to explore future opportunities to work with the **Hawkesbury Institute for the Environment.**

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