

RESEARCH DIRECTIONS

Grassland pests the root of the problem

Associate Professor Sally Power and Dr Scott Johnson, of the Hawkesbury Institute for the Environment, have been awarded funding to investigate the effect of erratic rainfall on Australia's important but dwindling grasslands. The project, which is supported by the Hermon Slade Foundation, will particularly look at the role of below-ground insect pests under differing rainfall regimes.

'Climate models predict more extreme rainfall patterns in the future, including reduced rainfall amounts, prolonged periods of severe drought and longer intervals between rainfall events,' says Associate Professor Power. 'The combination of future rainfall extremes and damage caused by root herbivores may push ecosystems towards ecological tipping points where fundamental, potentially irreversible changes occur.'

Grasslands support a wealth of biodiversity and provide valuable ecosystem services. Temperate grasslands are one of the most threatened ecosystems in Australia, with less than one per cent of pre-European settlement area now remaining. Their productivity and diversity are closely linked to climatic conditions, especially overall amounts of rainfall and the timing of rain events. 'Root herbivores are a ubiquitous feature of Australian grasslands and the disruption they cause to root function is likely to amplify the effects of drier soils', says Dr Johnson. 'As soil water declines, pest activity and numbers are likely to decline, but heavier downpours could lead to a population explosion'.

This project will examine the effect of rainfall extremes on the make-up and diversity of the grassland plant community and the role below-ground insect pests play in amplifying the impact of changing rainfall patterns. Specifically, it will measure the effects of reduced amounts of rainfall and less frequent rain events on the productivity of



individual plant species growing within a mixed grassland community. At the same time, the project will also assess the responses of root herbivores to changing rainfall patterns and the extent to which these pests make grassland plants less resilient to rainfall extremes. This experiment will make use of 48 rain exclusion shelters recently installed at the HIE.

The study will provide new insights into the likely consequences of future climate change and identify potential land management options for mitigation. Of particular interest is how rainfall change and the impact of root eating herbivores will affect the ability of grassland ecosystems to deliver important ecosystem goods and services – such as carbon sequestration, forage production, soil stabilisation and habitat provision for agricultural pollinators.

Project Title: Drought, deluge and diversity decline – How do root herbivores affect grassland resilience to predicted changes in rainfall patterns?

Funding has been set at: \$83,000

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