

Genetic diversity in the biological control process: *Acacia nilotica* as a test case

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Summary *Acacia nilotica* (prickly acacia), identified as a Weed of National Significance, now covers over seven million hectares and 2000 kilometres of bore drains in Northern Australia. While the use of fire, mechanical and herbicide treatments are available, these methods are often not financially viable or suitable to control prickly acacia across the range of areas that it currently infests. The establishment of effective biological control agents will provide the most significant contribution to the integrated control of this pest. However biological control of this and many other weed species has had little success to date. There is growing evidence that changes in the genetic diversity and fitness of biological control agents may be reducing the success of classical biological control efforts.

Using genetic technology, this project aims to investigate the genetic impediments which may reduce the effectiveness of current biological control methods, using prickly acacia as a test system. There are three sections to the proposed project. Firstly, the source and breadth of the genetic diversity of

A. nilotica will provide insight into its breeding system and number of introductions. Secondly, an approved host specific biological control agent, the geometrid moth *Chiasmia assimilis* will be imported from South Africa, and the population genetic diversity monitored over multiple generations to demonstrate changes in the level of inbreeding between group reared lines of insects (the usual breeding practice) and isofemale line rearing methods. After the promotion of hybrid vigour in the isofemale lines, the comparative fitness will be assessed. The third section of the project will determine the genetic changes which have occurred in a biological control agent, *Bruchidius sahlbergi*, since its introduction to Australia 20 years ago. The synthesis of this project aims to challenge the existing paradigms concerning the genetic basis for selection, laboratory maintenance and release of insect biological control agents.

Keywords Biological control, *Acacia nilotica*, prickly acacia, genetic impediments, isofemale lines, genetic diversity, *Chiasmia assimilis*, *Bruchidius sahlbergi*.