

## Management of invasive rangeland shrubs

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**Summary** There is currently a suite of exotic shrubs invading northern Australia's rangelands, three of which (*Parkinsonia aculeata* L., *Acacia nilotica* L. and *Prosopis* spp.) are listed as 'Weeds of National Significance'. For many of these shrubs little is known about their biology or the best methods of control and containment. As limited resources preclude detailed research on each species, a project is currently in progress to determine if results from focused efforts on selected species (*P. aculeata* and *Jatropha gossypifolia* L.) can be used to develop generic solutions to exotic shrub problems in northern Australia's rangelands. Existing knowledge on other woody weeds that have been previously studied (e.g. *Acacia nilotica* and *Prosopis* spp.) will also be utilised.

*Parkinsonia aculeata* (parkinsonia) has been selected as one of two case study species as it is one about which a number of state and federal agencies have recently expressed concern and to which they have committed resources. It is also one of the most widespread woody rangeland weeds, and as such provides an excellent opportunity to undertake investigations across a range of habitats and prevailing climatic conditions. In contrast, *J. gossypifolia* (bellyache bush) is presently more restricted in its location, though it has potential to infest much of northern Australia.

Both ecological and weed management studies are being undertaken, and results are being incorporated into a modelling framework. Ecological studies are focused on finding answers to key questions about the weeds' biologies and how they respond to imposed treatments. Emphasis is placed on understanding seed bank dynamics, age to reproductive maturity and changes in population dynamics following implementation of control activities.

Weed management studies are investigating the susceptibility of the target weeds to the most commonly used control techniques. These include the use of herbicides, machinery and fire. Upon completion, individual control techniques will be combined to develop integrated management strategies that not only deal with the initial infestation but also the seedling

growth that arises following commencement of control activities.

While the project is still in its early stages, some interesting findings have already been generated and are starting to provide an insight into possible similarities that may be progressed towards development of generic solutions for rangeland shrubs.

One example is a relatively consistent response to mechanical techniques. There are many mechanical options available to land managers, including grubbing out plants individually using tractors or bulldozers, stick raking, blade ploughing and chain pulling. Mortality is consistently higher if the plant is cut off below ground, which can be achieved using blade ploughs or cutter bars attached to various pieces of equipment, such as stick rakes and ripper blades. In contrast, cutting plants off above ground e.g. by chain pulling, often results in low mortality as a stand alone treatment, but it can be a valuable tool when integrated with other treatments, particularly fire. It is effective in putting standing material on the ground, thereby adding to the potential fuel load for subsequent fires that may be implemented.

Seedling regrowth after mechanical control also appears similar across rangeland shrubs generally, with the physical disturbance created providing a favourable environment for mass germination following good rain.

Besides these similarities, there are also some distinct differences identified between species in their ecology and the way they respond to imposed treatments. For example, their susceptibility to fire can vary markedly, ranging from highly susceptible to highly tolerant.

While it appears likely that this project will identify some generic recommendations regarding invasive rangeland weeds, there will be an ongoing need to undertake specific research on individual weed species.

**Keywords** Parkinsonia, bellyache bush, *Parkinsonia aculeata*, *Jatropha gossypifolia*.