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# Technical updates



Section 6

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## Controlling prickly acacia with soil applied herbicides

Mike Chuk

Soil applied herbicides, either in liquid or solid form have been available for the control of woody weeds such as prickly acacia for a number of years. They have been promoted as a cost-effective method of controlling the weed over large areas, or as a convenient means of spot treating scattered plants found when undertaking other management activities.

Cost, and the difficulty of ensuring even application have generally precluded the widespread use of the solid herbicides such as Graslan® and Reclaim® on prickly acacia. The liquid herbicide Velpar® on the other hand, has found favour in some areas for treating prickly acacia in open grassland where no other woody species are present. The significantly lessened labour costs compared with basal spraying, combined with logistical efficiencies (i.e. no drums or tanks of diesel to transport) have provided some incentive to use this method of control.

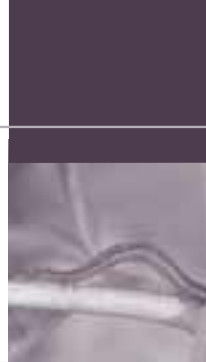
Disadvantages of use of soil-applied herbicides are:

- It can be difficult to measure the exact amount of herbicide required for a given tree size, which can be a problem in denser stands of trees. The tendency can be to over treat, which can result in non-target and off-site impacts.
- Depending on soil type and weather, it may be some time before results become visible, which may be a problem where payment for the job depends on results.

- Before adequate rainfall occurs, they can be blown away or disturbed by stock camping under trees.
- They are not sufficiently selective to permit their use in mixed communities of woody plants.
- Over application may result in temporary soil sterility. This may be useful in preventing regrowth, but can often result in loss of desirable pasture species and the resultant potential for soil erosion.
- They are not registered for use in streamline areas.<sup>9</sup>
- Away from streamlines, overland flow during heavy rain events can move the chemical down slope and adversely affect desirable native species.

In summary, soil-applied herbicides have proved beneficial in controlling prickly acacia on many properties where scattered trees are impacting on open grasslands. Unfortunately, however, the thickest and most intractable stands of prickly acacia are often found in drainage lines and dam backwaters, where there are often non-target, vulnerable native species that can be adversely affected. For example, coolibah along creek lines in the Mitchell Grass Downs of western Queensland —*Eucalyptus coolibah* has been badly affected where areas of prickly acacia have been treated with soil-applied chemicals.

<sup>9</sup>Always read and adhere to herbicide label directions when using soil applied or any other herbicide.



It is in these areas that basal bark and overall spraying, combined with selected mechanical control of thicker areas are preferred as control techniques.

As destruction of non-target native species is potentially an offence under legislation advice on this matter should be sought from appropriate departmental officers.



Nathan March

▲ Soil application of Velpar to prickly acacia





## Biological control of prickly acacia

Bill Palmer

Biological control is the process of introducing the natural enemies of exotic weeds to reduce their growth and reproductive capacity, or to kill them. Biological control agents are the selected natural enemies (insects or diseases), which are used to keep weeds under control.

In 1979, the Department of Lands (now the Department of Natural Resources, Mines and Energy) began surveying potential biological control agents in Pakistan. Further research was initiated in Kenya from late 1989 and, in 1997, a preliminary survey of insect and pathogen fauna on prickly acacia in South Africa was undertaken. The South African survey found over 400 insect species on the trees. From this, a further group of promising insects was identified and a field station was established to assess potential control agents.

To date, research on possible biocontrol agents for prickly acacia has resulted in the introduction of five insects:

- a tip-boring moth *Cuphodes profluens*
- a seed-feeding beetle *Bruchidius sahlbergi*
- the leaf-feeding beetle *Homichloda barkeri*
- two leaf-feeding geometrid (looper) caterpillars *Chiasmia inconspicua* and *Chiasmia assimilis*.

It is anticipated that a sixth insect, *Cometaster pyrula*, a leaf-feeding caterpillar from South Africa, will be released in early 2004.

The tip boring moth, *Cuphodes profluens*, has not been detected in the field and probably did not become established.

The beetle, *Bruchidius sahlbergi*, established successfully and is now widespread. Though its level of predation on seeds can vary from 0 per cent to 80 per cent depending on the availability of mature pods, it appears to be having a minimal impact on the spread of prickly acacia. Populations of *Bruchidius* decline when pods are scarce due to stock grazing, floodwaters or climatic conditions, but there are higher insect populations when there is a permanent reservoir of pods. Seeds also 'escape' predation by the beetle by being eaten by stock.

The leaf-feeding beetle, *Homichloda barkeri*, was released from late 1996 to 1999 but, to date, establishment has not been confirmed.

The two leaf-feeding geometrid (looper) caterpillars (*Chiasmia inconspicua* and *Chiasmia assimilis*) from Kenya were released in late 1998 and June 1999 respectively. Though it's too early to know if these insects have established, there are some indications of establishment of *C. assimilis* in coastal areas.

Exploratory research in Africa has now concluded. However, as it has now been ascertained that the prickly acacia in Australia originated in India, it is hoped to undertake further work in that country over the next few years.

Landholders have been involved in the introduction of biological control agents through release programs conducted by the Department of Natural Resources, Mines and



Energy Tropical Weeds Research Centre. In particular, as insects have become available for release, landholders have helped with their distribution and/or monitoring on properties throughout the prickly acacia range.

NRM&E



▲ Host testing of prickly acacia biological control agents



Jeff Wright

▲ *Homichloda barkeri*

Marie Vitelli



▲ *Bruchidius sahlbergi*



Jeff Wright

▲ *Chiasmia* spp.





## Environmental impacts of prickly acacia

Richard Johnson

Though the casual observer might think that the Mitchell Grass Downs are empty of wildlife, they are in fact full of animals—some of which are found nowhere else. While prickly acacia has long been recognised as having severe economic impacts on grazing production, little was known about its potential effect on the environment and whether it is a threat to the special wildlife of the Mitchell Grass Downs

A similar pattern of replacement of grassland species by others more typical of woodlands was seen in the bird populations of the sites. Bird species lost included the singing bushlark, Australian bustard and little button quail.

'The Mitchell Grass Downs is the largest grassy ecosystem in Australia.'

To help answer that question, the Queensland Parks and Wildlife Service set up a small-scale study on two properties. We compared the fauna of five infested and six un-infested sites and found significant changes in the bird and reptile fauna.

Invasion of native grasslands by prickly acacia is a structural change characterised by loss of grass cover, increased bare ground and development of a shrub layer 2–6 m high. There also seem to be soil structure changes, with loss of the cracking characteristics of the clays. This might be made worse by the concentration of cattle around prickly acacia plants as they forage and seek shade.

In grassland sites there were several lizard species that relied on ground cover, which were absent from prickly acacia infestations. They appeared to have been replaced by a lesser number of lizard species adapted to open ground environments. This is a significant finding. The disappearing species included one found only on the Mitchell Grass Downs—the skink *Ctenotus agrestis*.



Nathan March

▲ Richard Johnson studying the Mitchell Grass Downs fauna with the aid of pit traps



Why did these changes occur? We hypothesise that the loss of grassy cover affected the grassland lizards and birds in several ways. The loss of grass tussocks and litter may lead to a reduction in food resources derived directly from the plants (seeds, green material) or dependent on plants (insects). The loss of ground cover leads to a much higher ground temperature, which reduces the time that heat-sensitive lizards can spend searching for food. The loss of shelter provided by grass tussocks may lead to greater exposure to predators like hawks. In the case of the lizards, which shelter in soil cracks, the changes in soil structure are probably another problem. The grassland birds lost were ground-nesters. The loss of grasses would mean loss of nest sites in grass tussocks and loss of shade and camouflage for the nest and its contents.

The Mitchell Grass Downs is the largest grassy ecosystem in Australia, and one of the largest in the world. It supports the following unique fauna species:

- the Julia Creek dunnart
- an endemic form of the long-tailed planigale
- three lizards
- at least one snake.

It is also the major habitat for many other grassland animals, both at the state and national levels. All of these species have evolved with the grasslands and depend on their continued health. The overall change revealed in our small study was displacement of grassland-dependent birds and reptiles as the grassland was converted to shrubland. As it may render large areas unsuitable as habitat, invasion of the downs by prickly acacia is likely to be a severe threat to these species.



Nathan March

▲ Long-tailed Planigales live in the Mitchell grass downs

*'The Mitchell Grass Downs are in fact full of animals'.*



Courtesy of Tima Ball, QPWS

▲ Australian Bustard





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