

# Parkinsonia control



## Section 3

# Parkinsonia control

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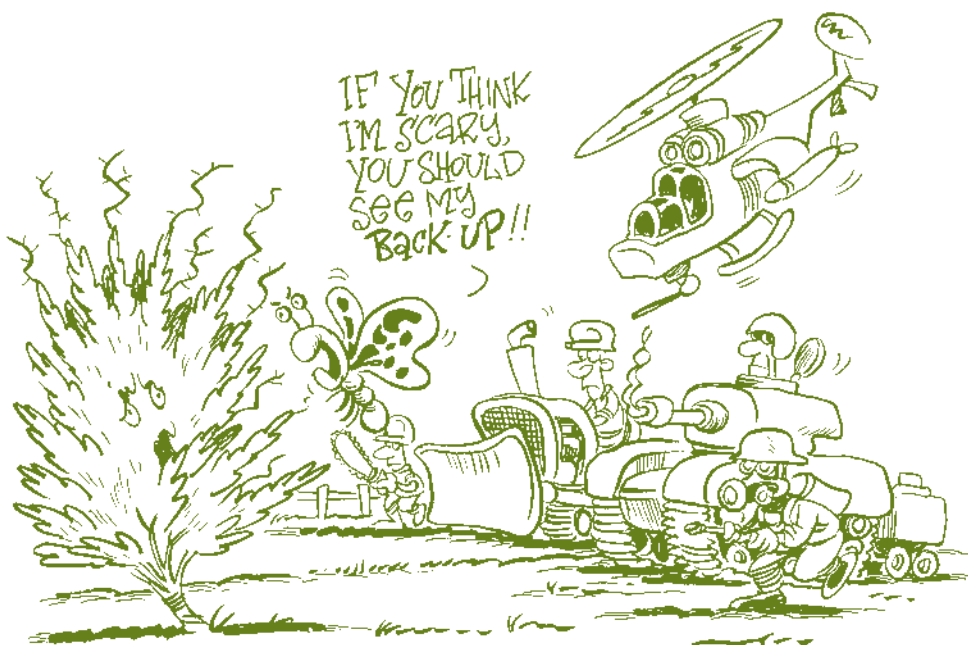
Although isolated trees or small clumps of parkinsonia may appear not to be a threat to the environment or an impediment to land management, individual plants will be the origin of future large infestations. Controlling parkinsonia before it takes hold is the most cost-effective approach to management.

A range of tools and techniques is available for parkinsonia management though at this stage there is no one method or 'best practice' for effectively managing extensive infestations. The most suitable control method may depend on the season, the type of country and extent of infestation, the identified environmental or economic risks, and the resources available. The combination, timing, intensity and frequency of treatments will also influence the effectiveness of the

control program. No matter what control method is used, new recruits will appear for many years after initial control, and it will always be necessary to undertake several follow-up treatments on regrowth.

Although some of the research is incomplete and inconclusive, anecdotal evidence and preliminary findings suggest that the following methods can be considered for controlling parkinsonia:

1. herbicide control
2. mechanical control
3. fire
4. grazing management systems
5. native organisms
6. introduced biological control agents
7. integrated management techniques.





## Control methods

### 1 Herbicide control

Table 2 lists the herbicides registered for the control of parkinsonia. Chemical control measures always need to be followed up as some trees may be missed in the first treatment, and re-growth can occur from stumps or seeds.

- **Aerial application.** Application of herbicides, either liquid or granular, can be done by helicopter or fixed-wing aircraft fitted with purpose-built applicators. This technique is useful for dense, strategic infestations but consideration should be given to the proximity of water bodies, areas of native or desirable vegetation, and environmentally sensitive areas.



John McKenzie

▲ Application of a foliar herbicide using a helicopter

- **Foliar (overall) spraying.** Spraying the foliage and green stems of parkinsonia is a very effective control method for the treatment of actively growing seedlings up to 1.5–2 m tall. Leaves and stems should be sprayed to the point of run-off, and for best results a wetting agent must be used. The choice of application equipment depends upon the size, height, density and extent of the infestation.

For isolated or scattered situations, manual hand-held or back-pack spray units may be sufficient. As the density and size of the infestation to be treated increases, the use of four-wheel motorbike, four-wheel drive or tractor-mounted PTO, hydraulically or independently operated spray units with extension hoses will be more appropriate.



John McKenzie

▲ Herbicide application using a plane



- **Basal bark spraying.** Plants can be killed by applying herbicide mixed with diesel to their trunks or stems. For stems of up to 5 cm diameter, carefully spray completely around base of plant from ground level to between knee and hip height. To increase susceptibility, plants should be actively growing.

The trunk may need to be cleared of grass and the stem should be dry before spraying. Because parkinsonia-infested areas are often subject to flooding, care is also needed to ensure that mud and flood debris does not prevent spray reaching the bark.



- ▲ Andrew Burrows (NRM&E land protection officer) basal bark spraying a parkinsonia plant



- ▲ Chris Moloney of Bibil using a chainsaw for cut stump application of herbicide

- **Cut stump application.** Cut stems off less than 15 cm above ground level with a brush-cutter, chainsaw, brush hook or axe. Immediately swab or spray the cut surface and remaining stem with herbicide mixture. This process can be performed at any time of year.



- **Soil application.** Parkinsonia can be controlled by spot gun or granular herbicide treatments. Both soil-applied herbicides registered for use on parkinsonia (tebuthiuron and hexazinone) also have a residual affect with the potential to control seedling recruitment. Herbicides are sold as either granular or spot spray formulations. Place doses close to tree trunk—either with spot gun on clear bare ground; underground with ground injector; or evenly under the canopy and close to the trunk using a granular applicator. Herbicides should be applied to dry soil and will require rain before the chemical is taken up by plants. Do not use soil-applied herbicides within 100 m of watercourses. As well, do not use near desirable trees or shrubs or in areas where their roots may extend, or where the chemical may be washed into contact with their roots.

Table 2 lists which registered herbicides are appropriate to use with the above techniques as well as other relevant information.



John McKenzie

- ▲ Soil-applied herbicides will kill mature plants as well as having a residual affect. Hexazinone was the chemical used at this site near Rockhampton, Queensland



**Table 2 Registered herbicides for parkinsonia control: product and application information**

Application method	Active chemical constituents	Product names	Registered states	Rate	Optimum stage and time	Comments
<b>Aerial</b>	tebuthiuron	Graslan	Qld and NT	10–15 kg/ha	Apply prior to seasonal rainfall. Use a higher rate on dense growth or heavy soils.	Normally applicable to areas larger than 100 ha. Consult Dow Agrosience prior to application (phone: 1800 700 096).
<b>Aerial (helicopter only)</b>	triclopyr + picloram	Grazon DS, Grass-up, Triclozon, Trichloram, Tri-Pick, Picker	Qld and NT	3 L/ha	Seedlings 1–2 m tall or 12–24 months old. Avoid dry conditions, stressed plants or pod-bearing plants. Thoroughly wet foliage.	Apply oil-based wetting agent at 1 L/hectare.
<b>Foliar (overall spray)</b>	triclopyr + picloram	Grazon DS, Grass-up, Triclozon, Trichloram, Tri-Pick, Picker	Qld, NT and WA	350 mL per 100 L water	Plants to 2 m tall. Avoid dry conditions, stressed plants or pod-bearing plants. Thoroughly wet foliage.	Wet plant thoroughly. Use oil-based wetting agent.
<b>Basal bark</b>	triclopyr + picloram	Access	All states	1 L per 60 L diesel	Seedlings less than 2 m tall, or up to 5 cm diameter and actively growing.	Do not treat wet stems.
<b>Cut stump</b>	triclopyr + picloram	Access	All states	1 L per 60 L diesel	Throughout year.	Cut close to ground level and treat <i>immediately</i> .
<b>Soil</b>	tebuthiuron	Graslan	Qld and NT	10–15 kg/ha 1–1.5 g/m <sup>2</sup>	Throughout year. Best applied to dry soil before rain. Needs moisture to activate herbicide.	Refer to label for critical comments.



**Table 2 Registered herbicides for parkinsonia control: product and application information (continued)**

Application method	Active chemical constituents	Product names	Registered states	Rate	Optimum stage and time	Comments
<b>Soil: spot spray</b> (individual tree)	hexazinone	Hexazinone Bobcat® SL	Qld, NSW, ACT and WA	4 mL/ spot, 1 spot for each bush or tree	Bushes or trees up to 5 m tall.	Best when trees in active growth, and either soil is moist or rainfall will follow.
		Velpar® L	Qld, NSW and WA		Shrubs/trees up to 5 m tall. Throughout year. Needs moisture to activate herbicide.	
<b>Soil: spot spray</b> (grid pattern)	hexazinone	Bobcat® SL	Qld, NSW, ACT and WA	1 mL per spot to 1 m tall		
		Velpar® L	Qld, NSW and WA	4 mL per spot to 5 m tall		

**Notes**

1. Minor 'off label' permits have been obtained for specific uses in all states. For more information, refer to your local government pest management officer or state agricultural or primary industries department.
2. Prior to using herbicides, carefully read and follow all label directions and special restrictions that may apply (e.g. application distances from recognised watercourses and remnant vegetation). Do not use soil-applied herbicides within a distance of 2–3 times the height of desirable trees. Use must be in accordance with the state and/or local government native vegetation legislation.





## 2 Mechanical control

Mechanical options include clearing infestations by grubbing, stick raking, blade ploughing, chain pulling or using a cutter bar. Research and anecdotal evidence indicates that mechanical clearing is most effective when the roots of plants are removed or sheared off below the bud zone (20–30 cm below ground level). This decreases the potential for post-clearing regrowth. Best results are achieved when the plants are stressed, which generally coincides with the dry season. The exception is blade ploughing which still has good results when there is some soil moisture.

For small plants, hand-pulling or grubbing with a mattock can be effective. For scattered infestations, a backhoe or tractor fitted with a front-mounted blade may be used to remove individual plants.

Initial clearing by stick raking or blade ploughing is an effective way to reduce the standing volume of parkinsonia and increase its susceptibility to other forms of treatment. Preliminary results suggest that correct use of



John McKenzie

▲ Rear-mounted blade plough

a blade plough results in very high parkinsonia mortality (application of these techniques are further discussed in Section 7, 'Technical updates').

However, it is probable that the physical disturbance of soil associated with clearing creates an ideal seed bed, resulting in increased seed germination and necessitating mechanical or herbicide follow-up control.

To minimise the risk of soil erosion, heavy mechanical work must be restricted to reasonably level areas away from watercourses. In most states and territories tree-clearing permits will need to be obtained if there is a risk that native vegetation will be affected by control techniques.

▼ Front-mounted blade plough (Ellrott design)



John McKenzie

▼ Dozer pushing



John McKenzie

### 3 Fire

The effect of fire on parkinsonia appears to be variable and will depend on fire intensity and season. Fire has been observed to destroy seedlings if sufficient fuel load is present, and in some circumstances mortality of adult plants has been reported.

However, the use of fire is frequently limited by lack of fuel load, social or cultural constraints, the safety risks of late dry-season burns, the desire to conserve valuable livestock fodder, and concern about non-target environmental effects, particularly in wetlands and riparian habitats.



▲ The Department of Natural Resources, Mines and Energy is continuing its assessment of fire through trials



John McKenzie

▲ Sufficient fuel is required for an effective fire

Other important factors to consider with fire include:

- What is the desired outcome?
- When is the best time for this fire?
- What is the seasonal weather outlook? Check the Southern Oscillation Index.
- What fuel load is required? Note that fire intensity increases with fuel load.
- Will fencing be needed to manage pre- and post-fire grazing?
- Is it possible that non-target vegetation may be killed? Ensure that you comply with government vegetation management legislation.
- What safety precautions (e.g. fire breaks) need to be taken? The risk of wildfire can continue for some days after a controlled fire.
- When will follow-up operations be required?

It is also important to notify neighbours and obtain a permit from a fire warden before burning.

Further discussion on the potential use of fire for parkinsonia management is provided in Section 7, 'Technical updates'.





#### 4 Grazing management systems

Although cattle browse on parkinsonia foliage and repeated physical damage and defoliation may cause the death of juvenile and small adult trees, there is currently no clear data available regarding the relationship between the grazing of cattle in infested areas and parkinsonia dispersal or mortality. Under normal grazing conditions, cattle will generally select other species for browsing so parkinsonia control due to cattle grazing seems to be minimal.

By contrast, camels browse on parkinsonia shoots, flowers and pods, and since only around 8 per cent of the seed is viable after passing through camels, such grazing drastically reduces soil seed bank levels. Several landholders in recent times have incorporated camels as a parkinsonia control option (J McKenzie, pers. comm., August 2003).

Heavy native pasture cover is likely to compete with parkinsonia seedlings for light and moisture, thus limiting parkinsonia germination and survival. However, it is not yet known whether these competitive effects will be strong enough to affect existing parkinsonia populations. Grass will also provide fuel for control using fire.

Physical damage of wetlands by livestock and pigs is likely to result in ideal habitats for parkinsonia recruitment. These areas are already at high risk of parkinsonia infestation because the seed is transported by floodwaters and parkinsonia favours seasonally wet environments. It has been suggested that fencing might be beneficial under those circumstances.



John McKenzie

▲ Camels will browse on parkinsonia foliage, flowers and pods



## 5 Native organisms

In Australia, parkinsonia is relatively free from attack by native insects or diseases. The most damaging is the giant termite (*Mastotermes darwiniensis*) which is capable of killing mature plants, although the plant's root systems may survive and send up fresh suckers (R van Klinken, pers. comm., July 2003). Other species that have been observed on parkinsonia include seven species of stem-sucking bugs; stem borers in trunks of large trees; two pod and seed feeders; two species of grasshoppers; and a case moth caterpillar that chews leaves. The combined impact of all of these insects on the plant is likely to be negligible (R van Klinken, pers. comm., July 2003).

Heavy coccid (mealybug) infestations have been reported in the Victoria River district where they have caused distortion of growth tips (R van Klinken, pers. comm., July 2003). Most observed plants were infected throughout the year. The impact of the coccids has not been quantified but plant growth is likely to be reduced. Probably they have most effect on plants that are already stressed.

Widespread dieback of parkinsonia has been observed in many parts of Australia, although the cause has not yet been determined. Plant diseases are one possibility.



Marie Vitelli

▲ Damage to a parkinsonia plant caused by the giant termite (*Mastotermes darwiniensis*)



## 6 Introduced biological control agents

Biological control is the process of introducing natural enemies of exotic weeds or other pests to reduce their growth, reproductive capacity or life expectancy.

Three species of insects have been introduced into Australia as biological control agents against parkinsonia: the parkinsonia seed beetle *Penthobruchus germani* (first released from Argentina in 1995) and *Mimosestes ulkei* (first released from the USA in 1993), and the leaf bug *Rhinacloa callicrates* (first released from the USA in 1989). Only *Penthobruchus* has become widely established.



▲ *Penthobruchus germani*



Marie Vitelli

▲ *Rhinacloa callicrates*

Existing biological control agents may not be having a significant impact on parkinsonia survival and reproduction in most parts of Australia. In addition, because of the wide range of environments and land management systems that are infested with parkinsonia, it is unlikely that individual biological control agents will be equally effective throughout parkinsonia's distribution.

CSIRO Entomology is currently conducting surveys for potential new biological control agents in Central America. Further information regarding the biological control of parkinsonia is provided in Section 7, 'Technical updates'.

Catherine Lockett



## 7 Integrated management techniques

A range of different parkinsonia management techniques is available to land managers. The underlying principle of integrated pest management is that the choice, sequence and timing of selected treatments is intended to enhance and build on the attributes and outcomes of each, and to complement routine property management.

Because of the complexity of developing an integrated management program it is recommended that landholders define their management proposal in an overall property weed management plan. Initially, the characteristics of the infestation must be identified and the capabilities, shortcomings and probable outcomes of different control methods need to be understood.

To begin a weed management project for parkinsonia, begin by dividing the property into areas of scattered, medium and dense infestation, and prioritise those infestations that are in the vicinity of watercourses and floodplains. Develop a long-term control plan, treating each identified site with the appropriate control methods.

Using a series of control methods, in which each enhances the performance of the next planned operation, and the activities fit in with routine property management, will give the best overall results in cost-effective parkinsonia management.

A more detailed explanation of the development of whole farm weed management plans is provided in Section 2. Further discussion of integrated management is included in Section 7, 'Technical updates'.

## Selecting the most appropriate control method

The following table and figure provide a range of information about the effectiveness of selected control methods. Table 3 rates the suitability of selected control methods in relation to different densities of infestation.



**Table 3 Suitability ratings for parkinsonia control methods relative to densities of infestation**

Control method	Density of initial infestation			Seedling growth
	Low density (<250 plants/ha)	Medium density (250–1000 plants/ha)	High density (>1000 plants/ha)	
<b>Herbicides</b>				
Foliar (aerial application):	✓	✓✓	✓✓✓	✓✓ (if high density seedling regeneration occurs)
Foliar (overall spray)	✓✓	✓✓	✓	✓✓✓
Basal bark spraying	✓✓✓	✓✓	✓	✓
Cut stump application	✓✓✓	✓✓	✓	✓
Soil-applied herbicides: tebuthiuron	✓✓✓ (hand applied)	✓✓	✓✓✓ (aerial application)	✓✓
Soil-applied herbicides: hexazinone	✓✓✓	✓✓	✓	✓✓
<b>Mechanical means</b>				
Grubbing (tractor pushing)	✓✓✓	✓		
Grubbing (dozer pushing)	✓	✓✓	✓✓	
Blade ploughing		✓✓	✓✓✓	✓✓ (if high density seedling regeneration occurs)
Front-mounted blade plough (Ellrott design)	✓✓	✓✓✓	✓✓✓	✓✓ (if high density seedling regeneration occurs)
Stick raking	✓	✓✓	✓✓	
Double-chain pulling			✓	
<b>Fire</b>				
Fire	✓✓	✓✓	✓✓	✓✓ (variable depending on timing and plant condition)

**Notes**

- 1 Suitability ratings are based on consideration of control effectiveness, efficiency and practicality, as follows: very good (✓✓✓), moderate (✓✓), low (✓).
- 2 Before applying herbicide and mechanical control methods, seek information on state and/or local government native vegetation legislation and guidelines.
- 3 Fire research is still in progress to determine the most effective fire regimes.



## Parkinsonia density standards

Nathan March and Andrew Burrows

### Low density <250 plants/ha



20 plants/ha



100 plants/ha

### Medium density 250–1000 plants/ha



250 plants/ha



600 plants/ha

### High density >1000 plants/ha



1000 plants/ha



3000 plants/ha



**Figure 3 Cost comparison of parkinsonia control techniques**

