The gorse (*Ulex europaeus*) eradication programme in Western Australia

John H. Moore\(^1\) and Matthew Kennewell\(^2\)

\(^1\) Department of Agriculture and Food Western Australia, 444 Albany Hwy, Albany, WA 6330, Australia
\(^2\) South Coast NRM Inc, Mercer Road, Albany, WA 6330, Australia

**Summary**

Gorse is a serious weed of New Zealand, and south eastern Australia. Plants are relatively easy to control but the seed bank is expected to last in the soil for 20–30 years. In Western Australia the gorse infestation covers less than 100 ha, spread over several hundred properties. A long term eradication programme has been implemented with the aim of eradicating gorse from WA. The programme developed by the Department of Agriculture and Food Western Australia includes funding for the control of plants, prevention of seed set, detailed mapping and high levels of surveillance over a long period. The South Coast Natural Resource Management Inc has committed to a 25 year programme. The Department of Agriculture and Food Western Australia provides legislative support through the Biosecurity and Agricultural Management Act and the local council has recently introduced measures to reduce the movement of soil contaminated with gorse seed.

This paper outlines the current activities and status of the eradication programme.

**INTRODUCTION**

Gorse (*Ulex europaeus* L.) was declared in Western Australia in 1976 and is a Weed of National Significance (WoNS). The Natural Heritage Trust (NHT) funded projects were implemented from 2002 for the control of gorse on public lands and the supply of chemicals and advice for control on private land (Moore 2002). This was followed by a research project into potential methods for controlling the long lived seed bank (Moore *et al.* 2006) and then the appointment of a biosecurity officer by the South Coast Natural Resource Management Inc. (SCNRM) to implement high levels of gorse control (Moore and Williams 2006). This was supported by the National Gorse Taskforce that identified gorse as a target for eradication in WA due to the low levels of gorse infestation.

Gorse plants are relatively easy to control but the seed bank is expected to last in the soil for 20–30 years (Hill 2001). In 2009 the SCNRM commenced a 25 year programme to eradicate gorse from Western Australia. The Department of Agriculture and Food Western Australia provides legislative support through the Biosecurity and Agricultural Management Act and the local council has recently introduced measures to reduce the movement of soil contaminated with gorse seed.

**MATERIALS AND METHODS**

The gorse eradication programme consists of mapping, surveillance and control components.

**Gorse mapping**

Gorse has been mapped at three levels. At the community level, the internet-based Weed Watcher allows members of the public to report suspected gorse infestations at the Department of Agriculture and Food WA (DAFWA) website. After these reports are verified by biosecurity officers of DAFWA, they are entered into the regulatory Client Resource and Information System. This constitutes mapping at the second or regulatory level and identifies the landholder responsible for the infested land. This database allows individual properties to be identified and a list of actions completed on that property to be displayed.

The third level of mapping undertaken is high resolution mapping to determine where infestations are within the property boundaries. This allows areas that are potentially infested with gorse seed to be identified and measures put in place to prevent movement of the seed and subsequent inspections for seedling emergence over the next 20 or more years.

**Surveillance and control**

Every infestation is inspected at least biennially and seedlings controlled. This ensures that seed set is minimised. Community awareness is raised in autumn and spring with media events and displays when gorse is flowering.

---

\*107* Seventeenth Australasian Weeds Conference
Treatments recommended in the Gorse National Best Practice Manual were tested on local infestations in Albany, Western Australia. They were sprayed in December and results taken 10 months later as shown in Table 1.

A specialised sprayer, the ‘Spraying Mantis’ was used to treat difficult areas. This is a tractor mounted sprayer with a long snorkel carrying a mister (or nozzle) that can direct spray in all directions. Metsulfuron methyl and Grazon Extra™ were applied to various areas with the Spraying Mantis using a mister head to apply low volumes of a more concentrated herbicide mix.

Equipment used in the plantation industry for controlling coppice was also assessed. This machine has a chainsaw on a mini excavator arm and a sprayer for immediately treating the cut stump.

In pot trials, no gorse established from seed that was planted more than 8 cm deep (Moore et al. 2002). This was tested in the field by burying topsoil more than 10 cm deep using a bobcat.

RESULTs

Surveillance There were 370 recorded infestations of gorse in WA, totalling less than 100 ha. About 90 infestations occur on private properties and the rest are on Government or Shire lands, where most of these are small roadside outbreaks consisting of only one to 10 plants. Nearly all the active infestations are within 50 km of Albany. One infestation is 250 km west of Albany on a property that has close links with Albany and with an earth moving company. Three other outlying infestations have been recorded in the past but no plants have been found at these locations for the past 10 years.

Several small new infestations are typically found each year. One was found by tracing back a known infestation to its likely source. This was an instance where water flows spread the infestation. Spread by birds appears to be of little importance in WA. There are a number of instances where new bushes or seedlings have been detected close to known infestations. About half of the new infestations are reported by community members and the rest discovered by the gorse officer. Many reports are of other species, such as Hibbertia spp., Jacksonia spp. and prickly Acacia spp., which look similar.

There are still a few old infestations that are not controlled. Most small and satellite infestations are treated annually. On areas being developed for housing the gorse seed infested top soil is usually buried during the development. There are still a few cases where soil is transported and new infestations emerge.

In most cases there are many seedlings for at least 3 years after large bushes are controlled.

Gorse mapping Figure 1 shows the Weed Watcher web application. Figure 2 shows the CRIS interface available to biosecurity officers with landholder details and actions performed. Figure 3 shows the high resolution mapping defining areas potentially infested with gorse seed.

Control The mixture of picloram and triclopyr (e.g. Grazon™) is used for most of the gorse control work, and provided the highest levels of control in the local trial (Table 1). Glyphosate is often used in more sensitive areas such as home gardens and along waterways. Metsulfuron methyl is occasionally used for larger infestations close to trees and by some landholders because it is somewhat cheaper. In nearly all cases the herbicides are mixed with 0.25% organosilicone adjuvant (e.g. Pulse™). Levels of control of the parent plant are usually very good. High volume hand spraying is normally used, and boom spraying of seedlings with metsulfuron methyl is occasionally used in grass pasture areas. Poor control of gorse was usually attributed to poor spraying technique or conditions. Failure to wet the whole bush evenly often results in portions of the bush recovering.

The levels of control with the Spraying Mantis were good, but not as good as high volume spraying (data not shown). The concentration of herbicide

**Table 1.** The efficacy of various herbicide treatments applied to gorse in summer and evaluated 10 months later.

<table>
<thead>
<tr>
<th>Herbicide⁵</th>
<th>Active ingredient</th>
<th>Rate⁶</th>
<th>% kill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazon Extra</td>
<td>Aminopyralid + picloram + triclopyr</td>
<td>1000 mL</td>
<td>100</td>
</tr>
<tr>
<td>Garlon</td>
<td>Triclopyr</td>
<td>333 mL</td>
<td>98</td>
</tr>
<tr>
<td>Roundup Biactive</td>
<td>Glyphosate</td>
<td>1000 mL</td>
<td>85</td>
</tr>
<tr>
<td>Brush Off</td>
<td>Metsulfuron</td>
<td>10 g</td>
<td>95</td>
</tr>
</tbody>
</table>

⁵ A 0.25% Pulse Penetrant™ was added to all treatments. Gorse was sprayed until wet, which is equivalent to approximately 2000 L ha⁻¹ of spray solution being applied to the gorse.

⁶ mL or g 100 L⁻¹ water.
Figure 1.
Weed Watcher – the web application that allows members of the public to report weeds showing gorse infestations.

Figure 2.
The regulatory database interface showing details of action and land ownership.

Figure 3.
High resolution mapping showing individual bushes and hedges with a 5 and 10 metre buffer zone that is likely to be contaminated with seed.
probably needs to be increased more in order to achieve similar levels of control. Larger and more difficult-to-access areas could be treated than is possible with hand held gear. It will be very useful as the primary control with follow up spraying in the following season. The mini excavator with chain saw and cut stump sprayer provided good control and left the site clean but is relatively expensive to operate.

In the burial trials, very few gorse seedlings established over the following 3 years on areas where the burial was effective. On some sites the soil was too shallow to effectively bury the infested top soil, and many seedlings established. This work showed that burial of infested top soil can be used to reduce the spread and establishment of gorse. In some situations on-site burial of small infestations is practical.

**DISCUSSION**
The eradication of gorse from an area will take a long time and requires a continual and sustained effort. The employment of officers dedicated to the task is considered to be a key ingredient for success. Continual surveillance by the community is required to identify new infestations. This is rewarded with prompt action at no cost. In Albany, which is a relatively small infestation, there are still new areas being discovered or created by soil movement. The legal requirement for control is an essential backstop to ensure all infestations can be treated. Local laws preventing developers moving seed infested soil has also helped.

The aim of the current programme is to prevent all seed set on gorse in WA. This is relatively easy to achieve on 80% of the infestation. The remaining 20% of the area is in situations that are difficult to control, and requires specialised equipment for access and control.

**ACKNOWLEDGMENTS**
Funds were provided mainly by SCNRM and DAFWA for this programme. Gary Dean, Jennifer Westwood and Phil Williams are the biosecurity officers involved in the project. Local landholders and many members of the community provide a range of support activities.

**REFERENCES**