

Triclopyr control of grey willow in New Zealand wetlands: initial field trials

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INTRODUCTION

Grey willow (*Salix cinerea*) is an extremely aggressive invader of wetlands with wind dispersed seed and a wide ecological tolerance range. Grey willow rapidly transforms swamps, fens and mesotrophic peat bog environments by altering vegetation structure and wetland function.

Large willow infestations in wetlands are controlled using aerial application (9 L ha⁻¹) of the non-selective broad spectrum herbicide glyphosate (Roundup®). Aerial boom spraying of glyphosate has been most effective where a closed willow canopy allowed good herbicide coverage with limited damage to understorey species. However, extensive damage to native vegetation can occur where grey willow is a broken canopy or when spot sprayed.

In February 2007 triclopyr triethylene amine (Garlon 360®) was registered for use in New Zealand in minimal outflow freshwater environments. In a pot trial, triclopyr was applied by knapsack to grey willow (<1 m tall) at a range of rates (0.25% to 5% v/v) with non-ionic surfactant added. All treated grey willows were killed at all rates. Non-target damage was also tested by spraying selected native plant species at similar rates. A range of native species were killed by triclopyr but it was much more selective than glyphosate (Champion *et al.* 2008).

The effectiveness of aerial application of triclopyr on grey willow was investigated in two field trials, along with non-target damage to understorey plants. The management objectives at both sites were to protect wetland values, native plant species and plant communities, and facilitate restoration by removing grey willow.

METHODS

Aerial boom spraying of triclopyr was tested at two trial sites (Table 1). At each site consecutive permanent

10 × 10 m plots were established along transects up to 100 m long. At all plots species present and percent cover were recorded prior to and post commercial aerial application of triclopyr nominally at 18.7 L ha⁻¹ (4% v/v). Aerial treatment at the privately owned Lake Mangahia, Waikato, was managed by Environment Waikato and had a single swathe aerial application. Aerial treatment at Stump Bay wetland, Turangi, was managed by the Department of Conservation (DOC) and had a four swathe aerial application, each at right angles. DOC also treated isolated grey willow (2–3 m tall) with ground based spot spraying of triclopyr in January 2008.

RESULTS AND DISCUSSION

Spot spraying at Stump Bay of mature grey willow reportedly gave 100% kill 9 months after treatment, with some damage to native *Carex* and *Juncus* species (L. Roberts, DOC pers. comm.). More off-target damage would have been expected with the use of glyphosate.

Initial aerial control of grey willow with triclopyr appeared excellent at both sites with 93–100% foliage brown 6 weeks after treatment. However, the overall kill rate was poor (Table 1), with epicormic regrowth on the trunks and base of most grey willow was evident 1–2 years after treatment.

The freshwater swamp (Stump Bay) had limited damage to understorey species with an increase in native seedlings, particularly tea tree (*Leptospermum scoparium*) and orchids. The peat lake margins (Lake Mangahia) had extensive damage to swamp coprosma (*Coprosma tenuicaulis*), and some damage to cabbage tree (*Cordyline australis*) and purei (*Carex secta*) understorey species, although kahikatea (*Dacrydium dacrydioides*) seedlings survived.

Triclopyr has good potential as an herbicide treatment for grey willow. Triclopyr has demonstrated the ability to kill grey willow through ground-based

Table 1. Wetland sites with corresponding aerial treatment and monitoring for grey willow (*Salix cinerea*).

Site	Treatment date	Number of plots (and transects)	Monitoring period	Kill of canopy grey willow
Stump Bay	December 2007	40 (4)	11 months	26%
Lake Mangahia	January 2009	15 (3)	14 months	<20%

spot spraying. As a more selective herbicide triclopyr may be useful in aerial application where grey willow canopy is sparse, causing less damage to understorey species than glyphosate.

The poor aerial application results to date may be due to insufficient foliage cover of herbicide or too high a concentration of triclopyr, which caused leaf burn and prevented translocation of herbicide. At this stage there is insufficient information to recommend effective aerial application of triclopyr on grey willow.

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REFERENCE

Champion, P., James, T., Singers, N. and Bodmin, K. (2008). Garlon® 360 trial for the control of wetland weeds. NIWA Client report HAM2008-124 for Department of Conservation. NIWA, Hamilton, New Zealand.