Herbicides for broom (*Cytisus scoparius* (L.) Link): testing alternatives to Grazon®

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Summary

Grazon® is registered for control of broom (*Cytisus scoparius*) and is used widely by Parks Victoria. Because of its volatility, however, Grazon cannot be used in close proximity to crops (such as grapes or tobacco), waterways and residential areas. An alternative registered herbicide for broom that can be used in such situations was required. This paper describes field trials that were conducted to determine effectiveness of Roundup® and Roundup Biactive®. As a result of this study Roundup and Roundup Biactive have been registered for control of broom.

Introduction

Broom (*Cytisus scoparius* (L.) Link) is a serious environmental weed in Victoria's Alpine National Park and surrounding areas. Communities where it poses a serious threat include the Bogong High Plains and other subalpine areas up to 1700 m above sea level. Many river systems sourced from these catchment areas, such as the Mitta Mitta and Snowy River systems are lightly to seriously infested. The herbicide, Grazon® (DowElanco; active ingredients triclopyr and picloram) is registered for broom control and is used widely by Parks Victoria and the Department of Natural Resources and Environment (DNRE). Because of its volatility, however, Grazon cannot be used in close proximity to crops (such as grapes and tobacco), waterways or residential areas. An alternative registered herbicide for broom that can be used in such situations is required. This paper describes field trials that were conducted to determine the effectiveness of Roundup® and Roundup Biactive® (called Biactive in the tables) (Monsanto; active ingredient glyphosate).

Methods

A trial area was located near the Bright Recreation Reserve. This area was divided into discrete broom plots. Each plot contained broom plants of variable age, including both isolated plants and dense thickets, and was of a size (10 × 10 m) to justify a tank mix volume (40–50 L) that would be representative of normal working rates. The treatments applied in the trials are described in Table 1. A slip-on spray unit with a single hand-gun was used to apply herbicide with a spray gun pressure of 180 psi.

First trial

Two application rates, 1.3% and 2.9% active ingredient were used. Based on other weed control treatments, application rates selected were those recommended for 2 m tall blackberry (*Rubus fruticosus* L. species aggregate) infestations and 1.5 m sweet briar (*Rosa rubiginosa* L.) infestations respectively. As broom may defoliate after flowering, it was considered appropriate to compare results with the addition of a wetting agent that may assist herbicide absorption into woody photosynthetic branches. A relatively high application rate of 0.2% of the wetting agent BS1000 was used to qualitatively assess importance of its inclusion. Roundup Biactive was applied on 13 May 1997, and Roundup was applied on 14 May 1997. Both applications were made in the afternoon. Prevailing weather conditions were calm, fine and sunny, daily maximum temperatures were 17 and 18°C respectively, following frosty nights.

Second trial

The second trial was conducted on 4 December 1997. In this trial additives, the wetting agent, BS1000, and the penetrant, Pulse®, were compared, as the latter is known to enhance absorption of herbicide, particularly by non-foliar areas of the plant. Treatments were applied as in Table 2 to seven plots. Prevailing weather conditions were calm, sunny and the external temperature was 26°C.

Results and discussion

First trial

Assessment was made on 20 November 1997. Observations (Table 1), made independently by several trained personnel, suggested that greater success had been achieved using the 2.9% glyphosate application rates (plots 2, 3 and 5). Nonetheless significant success was achieved by 1.3% glyphosate application rates particularly considering the late application. The addition of wetting agent was determined to be advantageous. The results from this trial prompted the second.

Table 1. Results of glyphosate spray trials on broom.

Plot	Herbicide		Wetting agent		Volume applied (L)	Shoot brownout (%)	Comments
	Type	% active ingredient	Type	% wetting agent			
Trial 1[A]							
1.1	Biactive	1.3	nil		40	>90	
1.2	Biactive	2.9	nil		50	>90	
1.3	Roundup	1.3	nil		40	>90	
1.4	Roundup	2.9	nil		40	>90	
1.5	Roundup	2.9	BS1000	0.2	40	>90	
1.6	Roundup	1.3	BS1000	0.2	40	>90	
Trial 2[B]							
2.1	Roundup	1.3	BS1000	0.1	50	85–90	Possibly due to insufficient coverage. Smaller bushes 100%
2.2	Biactive	1.3	BS1000	0.1	50	100	
2.3	Biactive	1.3	nil		50	100	
2.4	Biactive	2.9	nil		50	100	
2.5	Roundup	1.3	nil		50	100	2 small plants 40% due to insufficient coverage
2.6	Biactive	1.3	Pulse	0.2	50	100	1 large bush 60% due to insufficient coverage
2.7	Roundup	1.3	Pulse	0.2	50	100	Montpellier broom (*Genista monspessulana* (L.) L.A.S. Johnson) also present (also 100% brownout)

[A] Herbicide applied 13 and 14 May 1997, assessment made 20 November 1997.
[B] Herbicide applied 4 December 1997, assessment made 4 June 1998.

Second trial

Assessment was made on 4 June 1998. The results are presented in Table 1. Results overall were a good kill where sufficient coverage was achieved during spraying. Any differences between Roundup or Roundup Biactive, or the value of using various additives in the spray mix, could not be defined given the application rates used.

Table 2. Relative cost of mixed herbicide.

Herbicide	Cost (20 L)	Application rate	Cost (100 L of mix)
Grazon	$660	250 mL / 100 L	$8.25
Biactive	$133	1.3 L / 100 L	$8.65

[A] The advice provided in this document is intended as a source of information only. Always read the label before using any of the products mentioned. The author accepts no responsibility or liability whatsoever for any loss or damage arising from using the above products

Herbicide selectivity

The possibility of non-target damage is a key criteria in herbicide selection. Roundup and Roundup Biactive are non-selective herbicides. The possibility of the understorey surrounding the weed species being affected is high, particularly grass species. Similarly, with Grazon (a selective herbicide for woody weed control), the possibility of nearby woody species being affected is high. The legal use of herbicides near watercourses is covered by label registration. There is worldwide concern regarding the effects that surfactants have on amphibians. Most herbicides either contain surfactants or require their addition during mixing, to enhance adherence and absorption. Roundup Biactive (apparently 'surfactant-free') is claimed to be safe for use in and around watercourses in certain situations. Despite this, the application method should be designed to minimize the amount of spray actually entering any water.

Relative costs

Relative costs are remarkably close (Table 2). Factors affecting herbicide choice that should be considered, prior to cost considerations, are potential non-target damage and potential contamination of watercourses.

Registration for label use

The results were sufficient to start the registration process for Roundup and Roundup Biactive against broom. Lack of this registration did not prevent Parks Victoria from using Roundup for broom control in National Parks, as the agency is allowed to use herbicides at label rates for the control of off-label species provided Parks Victoria management agrees. Off-label recommendations, however, cannot be made to the public until the herbicide is registered. This places the agency in an awkward position, when undertaking control operations in conjunction with neighbouring landholders. Legislation in Victoria does allow for training and certification of DNRE staff to provide off-label advice. These considerations are now academic as Roundup and Roundup Biactive were registered for broom control in March 2000 and this use will appear on future labels.

Conclusions

These trials have shown that glyphosate is an effective herbicide for broom control. Satisfactory results were obtained at the 1.3% application rates if applications were made during periods of active broom growth. With this application rate, wetting agent or penetrant additives gave no additional benefit. Further trials may show that lower application rates are also effective during active growth and that additives may contribute to the level of control at such levels. While applications at the 2.9% rate gave control during early winter periods, when the plant was not actively growing, application at that time is not recommended as applications are most economically made when the amount of active ingredient applied is minimal.[A]

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