WEED CONTROL IN WESTERN AUSTRALIA USING BLANKET WIPERS

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Summary The technique of using a herbicide impregnated blanket for applying non-selective products to tall growing weeds in crops and pastures has been available for some time. The success of this technique has been limited to some extent by the cost of the unit, particularly the blanket. Testing a range of materials and using readily available irrigation fittings, the cost of constructing the unit has been reduced considerably. In addition various materials have been trialled to select a suitable backing. The unit has also been constructed in a manner that adjustable springs are incorporated to allow tensioning to accommodate various densities and species of weeds. Testing with herbicides such as glyphosate, chlorsulfuron, metsulfuron methyl and 2,4-D have given good control of a number of tall growing weeds in pasture.

INTRODUCTION

The technique for selectively applying herbicide to taller plants is not a new concept. In the 1970s after the introduction of glyphosate there was considerable interest in the USA for selectively treating tall grasses using rope wick applicators in cotton and soybean (Dale 1979) and for weed control in developing countries (Venn 1982). While these generated interest in Australia the commercial units were not well received because they were extremely expensive, had slow operating speeds and were not robust in construction (Peirce 1982). In Western Australia it was also shown that control of bracken (*Pteridium esculentum* (Forst. f.) Cockayne) was variable due to different rope configurations used (Moore and Jones 1988). Other methods to selectively apply herbicides to taller weeds have also been investigated using belt rollers (Schepers and Burnside 1976, Welker and Darlington 1980), but like the rope wick applicators they have yet to gain wide commercial acceptance.

A more practical design using a brush or blanket wiper has been available for some years and shown to be effective (Wills *et al.* 1990, Young 1990) but may be for reasons resulting from experiences gained during the era of the rope wick applicator, these have also had a fairly low level of acceptance. Tests conducted in Western Australia using various fabric materials have resulted in a much cheaper version of the blanket wiper (Rayner 1993, 1995). The blanket uses a cheap, readily available upholstery fabric. Liquid flow is controlled from a monitor that can vary the length of time that liquid can be injected into the blanket in a pulse, as well as the number of pulses in a given time. Speeds up to 12 km h^{-1} have been tested on some weed species with no loss of efficiency, with volumes of application 5–28 L ha^{-1}, which is considerably lower than the 200-400 L ha^{-1} that was used in tests during the late 1980s and early 1990s in eastern Australia (Wills *et al*. 1990).

This paper complements the poster which deals with the construction and operation of a blanket wiper which has been developed at Agriculture Western Australia.

MATERIALS AND METHODS

Treatments were applied to bracken, one and two leaf cape tulip (*Homeria flaccida* Sweet and *H. miniata* (Andrews) Sweet) and Guildford grass (*Romulea rosea* (L.) Eckl. var. *australis* (Ewart) de Vos).

Experiment 1. Bracken control in pasture Treatments were applied 17 June 1994 using a blanket wiper described by Rayner (1993) and a conventional boomsprayer. Plot size was 4 × 50 m, in an unreplicated experiment. Blanket wiper treatments were glyphosate (450) 6 L ha^{-1} + metsulfuron methyl 30 g ha^{-1} applied as a single pass or 12 L ha^{-1} + 60 g ha^{-1} using two passes. The volume of application for the single pass was 30 L ha^{-1}, the double 60 L ha^{-1}. Speed of application was 6 km h^{-1}. Boomsprayer treatments were: glyphosate (450) 3 L ha^{-1}, metsulfuron methyl 30 g ha^{-1}, glyphosate (450) 2 L ha^{-1} + metsulfuron methyl 30 g ha^{-1} using a volume of application of 140 L ha^{-1} at a speed of 8 km h^{-1}. Visual assessment of frond damage and subterranean clover pasture damage was taken on 16 May 1995 and frond counts m^{-2} taken on 18 December 1995.

Experiment 2. Cape tulip (one and two leaf) control in pasture Blanket wiper treatments were applied on 30 September 1995 using metsulfuron methyl at 0.5 g and 5 g ha^{-1} of product alone or in combination with 250, 500 and 1000 mL glyphosate (450). Speed of application was 8 km h^{-1} in a single pass delivering 5 L ha^{-1} of solution. Three replications were used in a randomized complete block design.

Cape tulip counts, 10 quadrats (50 × 50 cm) were taken on 28 June 1996 and values converted to percentage reduction for one leaf cape tulip. A visual pasture

assessment for cape tulip was carried out for the composition converted to percentage reduction.

Experiment 3. Guildford grass control in pasture The randomized complete block experiment contained ten treatments replicated three times with plots 4 × 20 m. Blanket wiper treatments were applied to Guildford grass on 15 September 1995. Volume of application was 5.2 L ha^{-1} and speed of application 8 km h^{-1}. Plant counts for 10 quadrats (25 × 25 cm) were taken on 4 June 1996 and values converted to percentage reduction.

RESULTS AND DISCUSSION

Experiment 1. Bracken control From the visual assessments taken the year the treatments were applied no subterranean clover damage was noted on the blanket wiped treatments compared to the 50 and 65% reduction in subterranean clover on the boomsprayed applications. Although no equivalent rates of chemical were used to compare the boomspray and blanket wiped treatments there is an indication that with refinement the blanket wiper could be quite useful in areas where the timing of treatments coincides with growth of annual pastures (Table 1).

Table 1. Comparison of blanket wiper and boomspray to apply chemicals for control of bracken.

	Rate ha^{-1}	Frond count m^{-2}	% Reduction bracken	% Clover damage
Boomspray				
Glyphosate (450)	3 L	12	52	55
Metsulfuron	30 g	6	95	65
Glyphosate (450) + metsulfuron	2 L + 30 g	5	98	50
Blanket wiper				
Glyphosate (450) + metsulfuron single pass	6 L + 30 g	6	93	0
Glyphosate (450) + metsulfuron double pass	12 L + 60 g	4	93	0
Untreated		16	0	0

All treatments applied with Pulse Penetrant® at 0.2%.

Table 2. Control one year after treatment of one and two leaf cape tulip using a blanket wiper.

Treatment	Rate ha^{-1}	% Reduction one leaf	% Reduction two leaf
1. Metsulfuron	0.5 g	88 bcd	52 b
2. Metsulfuron	5.0 g	97 d	94 cd
3. Metsulfuron + glyphosate (450)	0.5 g + 250 mL	84 bc	68 bc
4. Metsulfuron + glyphosate (450)	0.5 g + 250 mL	89 cd	90 cd
5. Metsulfuron + glyphosate (450)	0.5 g + 500 mL	85 bc	84 cd
6. Metsulfuron + glyphosate (450)	5 g + 500 mL	89 cd	94 cd
7. Metsulfuron + glyphosate (450)	0.5 g + 1000 mL	87 bcd	67 bc
8. Metsulfuron + glyphosate (450)	5 g + 1000 mL	88 cd	93 cd
9. Untreated		0 a	0 a

Values followed by the same letter do not differ significantly ($P<0.05$).

Table 3. Control of Guildford grass in pasture using a blanket wiper.

Treatment	Rate ha^{-1}	Plant counts m^{-2} 4/6/1996	% Visual reduction 4/6/1996
Chlorsulfuron + glyphosate (450)	1 g + 1 L	396 (81) b	60
Chlorsulfuron + glyphosate (450)	5.2 g + 1 L	405 (81) b	63
Chlorsulfuron + glyphosate (450)	5.2 g + 250 mL	310 (85) b	75
Untreated		2082 a[A]	0

[A] Values followed by the same letter do not differ significantly at the LSD (0.05) level.
( ) Percentage reduction.

The results for bracken control, even though not from a replicated experiment are consistent with those recorded by Moore and Jones (1988) using a rope-wick applicator and Young (1990) using a commercial blanket wiper (Weeds Wiper®). Because of the method used by Young (1990) quoting the dilution of the herbicide with water, it was difficult to make a comparison of the actual amount of chemical being used over a given area. The delivery system on the blanket wiper used in the Western Australian work gives measured pulses of liquid which can be converted to amounts per hectare thus an indication of chemical usage per hectare. A replicated experiment using the blanket wiper to apply metsulfuron methyl or glyphosate in early summer did not give the same visual control or reduction in frond numbers as quoted in this paper (J. Peirce and B. Rayner unpublished results).

Experiment 2. Cape tulip control Significant reductions in both one and two leaf cape tulip were obtained using the blanket wiper to apply as little as 0.5 g ha^{-1} of metsulfuron methyl, either alone or in combination with glyphosate (Table 2). Increasing the rate to 5.0 g ha^{-1} improved control, however the addition of glyphosate had little effect on cape tulip reductions at both the 0.5 g and 5.0 g rates. Both metsulfuron methyl and chlorsulfuron have activity on cape tulip, but their wide use in pasture when applied by boomspray is not favoured because of the damage caused to the legume component (mainly subterranean clover) of annual pastures. Results similar to those presented for metsulfuron methyl have been recorded for chlorsulfuron applied through the blanket wiper (J. Peirce and B. Rayner unpublished results). The possibility of using these products to replace the boomspray applications of 2,4-D amine/ester, which also lead to a decline in subterranean clover and dominance of grasses in pastures after several years of use, could be of considerable value. The use of 2,4-D amine/ester through a blanket wiper also gives control of cape tulip (J. Peirce unpublished results).

Experiment 3. Guildford grass control Only the results of four of the treatments are presented in this paper (Table 3). Chlorsulfuron at 1.0 g ha^{-1} with 1.0 L ha^{-1} glyphosate (450), and chlorsulfuron 5.2 g with 0.25 L and 1.0 L glyphosate (450) gave better than 80% control of Guildford grass in annual pasture without causing any damage to subterranean clover (Table 3). The results from combining the sulfonyl urea with glyphosate show a similar trend of slight inhibition or reduced performance compared to their use alone. The reason for the reduced performance is not clear. It may be associated with a compatibility problem, chemical interference within the plant or some uptake problem associated with the surfactants in the glyphosate or added to the chemical mixture.

CONCLUSIONS

Preliminary results indicate that the fabric used for the construction of the blanket and the method of attaching the blanket are robust enough for use on a range of weeds. The delivery system is accurate, because it can regulate the amount of chemical by the length of time the control valve is opened to release liquid to the blanket and the number of pulses or times the valve is opened in a given time.

The unit has been tested and shown to be successful on several other weeds. They include Paterson's curse (*Echium plantagineum* L.), Parramatta grass (*Sporobolus africanus* (Poir.) Robyns & Tournay), onion weed (*Asphodelus fistulosus* L.), South African or branched onion weed (*Trachyandra divaricata* (Jacq.) Kunth.) and carnation weed (*Euphorbia terracina* L.). It has also been used to apply glyphosate and paraquat to control the seed set of annual grasses such as barley grass (*Hordeum leporinum*, Link), brome grass (*Bromus* spp.), silver grass (*Vulpia* spp.) and annual ryegrass (*Lolium rigidum* Gaudin), in preparation for a cereal crop the following season.

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