WEED TRIALS USING A ROTARY WEED WIPER

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SUMMARY

Trials were conducted in the Waikato and King Country to assess the suitability of the Dinkum Rotary Weed Wiper for applying herbicide to Californian thistle (*Cirsium arvense*), nodding thistle (*Carduus nutans*), oxeye daisy (*Chrysanthemum leucanthemum*), ragwort (*Senecio jacobaea*) and rushes (*Juncus* spp.). Dense stands of mature weeds were generally well controlled; in many cases only a single pass was required. When using a double pass ground speed could be increased from 5 km/h to 10 km/h without loss of effect.

INTRODUCTION

The problem of controlling dense stands of the "hard to kill" weeds in pastures has always been a problem for farmers and others associated with weed control (Pottinger *et al* 1986). The use of high rates of herbicide or more active chemicals usually results in improved weed control but often at the expense of pasture damage (Makepeace and Thompson 1982).

During the 1970s a number of weed wiper type applicators were developed so that upright weeds could be selectively controlled with minimal pasture damage. The use of weed wipers also reduces the problem of herbicide drift onto non-target crops and their use has been encouraged near such crops. However, weed wipers have not been widely accepted for a number of reasons. One limitation is their inability to apply adequate herbicide to weeds in dense infestations as the replacement rate of herbicide in wicks is slow (Makepeace and Thompson 1982). Increasing the herbicide flow leads to an excess of herbicide in the wick causing dripping and pasture damage. Another disadvantage is that some herbicide formulations are filtered out of the spray mix by the wick. A new type of wick applicator, a rotary weed wiper, was tested for its suitability to control dense stands of some erect pasture weeds.

METHODS

Eight trials were carried out throughout the Waikato and the King Country during November and December 1989 on both sheep and cattle pastures. Weeds at all sites were treated during their bolting or flowering stage when they were a significant height above the pasture. Pastures were grazed just prior to application to reduce sward height.

Treatments were applied by a rotary weed wiper which was towed by a four wheel motor bike. The rotary weed wiper consists of a towing frame supporting a cylindrical woollen carpet wiper which rotates in a reverse direction when towed (Fig. 1). The herbicide solution is sprayed from a set of nozzles onto the wiper. At the rear of the wiper is a nylon brush which agitates the wiper and causes the foaming agent to froth into a lather. For trial purposes the weed wiper was fitted with removable carpet wipers and separate carpets were used for each chemical.

Trials were carried out on Californian thistle, nodding thistle, oxeye daisy, ragwort, and rushes with a single replicate of each treatment at all sites. Plots were 3 m wide, with a 1 m untreated strip between plots, and ranged from 40 m to 70 m in length as each site allowed.

Treatments (Table 1) included single and double passes, two towing speeds (5 and 10 km/h) and various rates of metsulfuron (Escort) glyphosate (Roundup) picloram + 2,4-D (Tordon 50-D) and 2,4-D (IWD Hi-Ester 2,4-D) (rushes only) and

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TABLE 1: List of treatments and number of sites.

Chemical	Rate (Prod.:water)	No. passes	Ground speed km/h	No. sites treated				
				Seja*	Jusp	Canu	Ciar	Chle.
glyphosate	1:20	1&2**	5&10**	5	1	1	2	
	1:10	1&2	5&10	3	1	1	2	
	1:3	2	5	1				
metsulfuron	0.1 g/litre	1&2	5&10	4	1	1	2	
	0.5 g/litre	1&2	5&10	5	1	1	2	1
picloram + 2,4-D	1:20	1&2	5	3	1	1	1	1
	1:10	1&2	5	2	1		1	
	1:3	2	5	1				
2,4-D	1:10	1&2	5		1			
	1:5	1&2	5		1			
clopyralid	1:30	1&2	5				1	
	1:15	1&2	5				1	

* Key: Seja-Ragwort; Jusp-Rushes; Canu-Nodding Thistle; Ciar-Californian Thistle; Chle-Oxeye Daisy.

** For No. of passes and ground speed '&' denotes treatment options, but not all combinations were used at all sites.

Fig. 1: Schematic diagram of rotary weed wiper.

clopyralid (Versatill) (Californian thistle only). The concentrations of herbicide used were based on earlier wick wiper recommendations and those of respective company representatives. The foaming agent IWD Hi-Foam was added to all treatment solutions at a rate of 6 ml/litre.

Visual assessments of percentage control were made at approximately 2 months and at 4 to 5 months after treatment by at least two observers on each occasion. Notes on pasture damage were made at each assessment.

RESULTS AND DISCUSSION

Most treatments gave adequate weed control, except for applications to oxeye daisy and for metsulfuron when applied to rushes. Initial concentration recommendations of 1:3 (product:water) for solutions of glyphosate and picloram + 2,4-D caused severe burning of ragwort and resulted in large quantities of chemical being used. These rates were used only at the first trial site and rates were reduced at subsequent sites.

Each of the three chemicals applied to ragwort gave adequate control, with small but non significant differences occurring due to ground speed, number of passes and the rate of chemical applied (See Tables 2.i—2.iv). This is an encouraging result as in all cases the ragwort being treated was in dense stands of mature plants. The fact that plants were well controlled at the faster speed or that a single pass was generally adequate suggests this machine was delivering herbicide efficiently to the plants.

TABLE 2: Percent ragwort control approximately 2 months after application. (Main effects taken over all sites).

Effects taken over all sites).							
i. Effect of chemical							
	metsulfuron		glyphosate		picloram + 2,4-D		
mean	87		76		80		
no.	22		16		10		
mean sed			6				
ii. Rates of chemical (Product:Water)							
	metsulfuron		glyphosate		picloram + 2,4-D		
	0.1g/l	0.5g/l	1:20	1:10	1:20	1:10	
mean	81	94	82	76	79	85	
no.	8	8	6	6	4	4	
mean sed	7		14		7		
iii. Ground speed (km/h)							
	5	10					
mean	87	84					
no.	7	7					
mean sed	9						
iv. No. of passes							
					1	2	
mean					76	89	
no.					18	18	
mean sed					5		

Control of nodding and Californian thistles ranged between 30% and 95% over all treatments. The lower rates of metsulfuron and glyphosate gave inadequate control of nodding thistle. Two passes appeared to improve the knockdown of Californian thistle although 5 months after treatment stem counts showed no consistent trend. The better results indicate further work is warranted to identify optimal rates and preferred chemicals.

Glyphosate at both rates used gave excellent control of rushes within 2 months. Both 2,4-D and picloram + 2,4-D gave good control although they were slower acting, taking up to 4 months to give maximum effect. A double pass improved control of rushes over a single pass at the lower rate of application. Metsulfuron had no effect on rushes.

Of the two herbicides applied to oxeye daisy metsulfuron was the more active but neither gave good control.

Pasture damage in all plots was minimal and concentrated around the target weed species. Damage only occurred when seed heads or tall growing foliage actually contacted the wiper. Overall damage was probably reduced by the grazing before application. All the herbicides tested resulted in some damage to clovers while glyphosate also killed grass species.

CONCLUSIONS

These trials, although largely unreplicated, have provided some preliminary data on the effectiveness of the rotary weed wiper at controlling some upright pasture weeds.

It has been shown that for most weeds investigated, the rotary weed wiper was able to deposit a sufficient quantity of herbicide to give adequate control although the variability suggests that further work is required. The new concepts of a rotating wiper and the formation of a thick foam on the wick would appear to provide this ability although no specific comparisons have been made.

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