WEED CONTROL IN URBAN ENVIRONMENTS IN NEW ZEALAND

IAN POPAY, GREG HOSKINS* and REG LEWTHWAITE**

Flock House Agricultural Centre, Private Bag, Bulls;
** MAF Technology, Kumeu; ** MAF Technology, Auckland.*

SUMMARY

This paper describes trials carried out in 1990-91 in North Shore and Wellington Cities. In North Shore City, different techniques were tested for effectiveness, particularly on nut grass (*Cyperus rotundus*) and Kikuyu grass (*Pennisetum clandestinum*), and treatment costs calculated. In Wellington City, similar techniques were tested for effectiveness, and citizen's views on the treatments were sought. Treatments included mechanical methods, flame or infra-red treatment, a new glyphosate application method, and fatty acid herbicides. Some were considered hazardous or unpleasant, and none of the alternatives tested was as cheap or effective as the standard treatment of glyphosate.

Keywords: urban weeds, glyphosate, fatty acids, mechanical weeding, flame weeding.

INTRODUCTION

The work reported here was undertaken to help Wellington and North Shore City Councils formulate their policies on weed control. Residents in parts of both cities are concerned about the health and environmental consequences of herbicides being used close to their properties, and are entitled to be heard.

In both places, alternative weed control methods were tested, and approximate costs calculated. Community involvement was encouraged by public meetings, and by seeking the views of residents, councillors and council staff on trial plots. In addition, in Wellington, girls from Wellington Girls' College helped assess plots.

METHODS

In Wellington, two different trial designs were used, mostly along footpaths, steps and roadside kerbs in Wadestown and Newtown. In previous years, the sites had been treated with herbicides where necessary. Many weeds were present, including species such as periwinkle (*Vinca minor*), garden nasturtium (*Tropaeolum majus*) and wandering Jew (*Tradescantia flumenensis*), sometimes regarded as garden, or ground-cover plants. In the first series of trials, replicated at four sites, six treatments were applied: - 1. normal spray (glyphosate + simazine), applied early Nov. 1990; 2. flame weeded, 18 Dec. 1990 and 12 April 1991; 3. Watkins "Safer" fatty acid herbicide (Topgun) applied 18 December 1990 and 12 April 1991; 4. Yates fatty acid herbicide (Greenscape), applied 18 December 1990 and 12 April 1991; 5. Line-trimming, early Nov. 1990; 6. 'Expedite' (a spray machine applying controlled droplet size, variable swath width and a timed walking rate) application of glyphosate on 25 Oct. 1990. In the second series of trials, replicated at seven sites, normal spraying with glyphosate and simazine in November 1990 was compared with a single line trimming in early November 1990 and with untreated plots. In both series of trials, some plots were mechanically trimmed, by mistake and at random, in mid-March, and at some sites, residents weeded plots. MAF staff applied flame weeding and fatty acid treatments, Monsanto staff applied the 'Expedite' treatment, a contractor applied the normal spray treatment, and City Council staff the manual treatments. Height and length of overhanging vegetation at four random locations in each plot were measured by MAF staff, aided by girls from Wellington Girls College. Local residents were asked to list their preferences at each site on one occasion, by questionnaire, and a special committee of councillors, council

Proc. 45th N.Z. Plant Protection Conf. 1992: 231-234

staff and residents listed preferences on several occasions. The MAF assessments were adjusted to match other assessments by scoring the 'cleanest' treatment at each site '1', the second cleanest '2', and so on, and averaging these scores across plots.

In North Shore City, trial sites were pavements and the associated kerbs and channels at the side of roads in Devonport, weedy because they had been untreated the previous year. Trial sites, treatments and frequencies of application, and main weeds present are shown in Table 1. Contractors applied herbicides and operated the edge cutter and the burner; Council staff applied hand-weeding treatments.

Treatments were allocated to plots at random. All herbicides were applied at recommended rates. In both cities, plot sizes varied from 5 m to over 200 m.

TABLE 1: Treatments applied in North Shore City.

Trial No.	Treatments	Frequency	Weeds present
1	2,3,4,5,9	l,h	e
2	2,3,4,5,9	l,h	b
3	2,3,4,5,9 (4 reps)	h	b,c,d,e,l
4	7,8,9	l,m,h	b,c,d,e,g,i,l
5	2,7	l,m,h	a,c,e,f,g,i
6	3,7	l,m,h	b,c,d,e,h,i,k
7	6	l,m,h	b,d,e,i
8	l	l,m,h	e
9	1,2,3,6,9	h	b,d,e,i,l
10	1,2,3,6,9	m	b,c,d,e,i,l
11	1,2,3,6,9	l	b,c,f,i,j,k,l

1 = mechanical edge-trimmer, 2 = glyphosate + Pulse, 3 = infra-red burner, 4 = line-trimmer, 5 = chipping spade, 6 = spade + line-trimmer, 7 = untreated, 8 = Watkins fatty acid weed-killer, 9 = Yates fatty acid weed-killer.

h = high frequency, applied 4-5 times a year (late Sept 1990, late Nov/early Dec 1990, Feb 1991, April 1991, July 1991)

m = medium frequency, applied 3 times a year (late Nov/early Dec, Feb, July)

l = low frequency, applied twice a year (late Sept or late Nov/early Dec, April)

a = *Coronopus didymus*, b = *Cyperus rotundus*, c = *Gnaphalium* spp., d = *Paspalum distichum*, e = *Pennisetum clandestinum*, f = *Picris echinoides*, g = *Plantago lanceolata*, h = *P. major*, i = *Poa annua*, j = *Stellaria media*, k = *Stenotaphrum secundatum*, l = *Trifolium repens*.

RESULTS

Detailed results are available from the authors (Hoskins *et al* 1991; MAF Technology 1991), or from Bevin Schultz, North Shore City Council. Slides and video records of the trials are also available. Glyphosate gave brown-off of most treated vegetation after 28 days and regrowth occurred after about 2.5 months. Both fatty acid herbicides, the infra-red burner and the flame weeder gave brown-off in 7 days or less: regrowth from these and the mechanical cutting treatments became obvious after 2 to 4 weeks. The line-trimmer spread cut grass, which needed sweeping up, and threw stones, which could be dangerous. Flame and infra-red weeders caused a fire hazard in warmer months, and parked cars had to be avoided. Fatty acid herbicides had a strong smell, and Wellington City Council staff thought they would be unacceptable to residents.

In Wellington, committee and public assessments are shown in Table 2A, and objective assessments in Table 2B, with glyphosate treatments combined and fatty acid herbicide treatments combined. In Trial A, the committee often preferred glyphosate treated plots, and in Trial B they preferred mechanical-trimmed plots. The preference

for freshly trimmed plots was clearly shown in the April assessment, after random trimming. The public questionnaire showed some preference for flame-weeded plots in Trial A, and for untreated plots in Trial B. Of those returning questionnaires (32 out of 110 distributed), most were opposed to herbicides and preferred suitable ground-cover plants. The objective assessments showed that the glyphosate treatments gave the best vegetation control, at least through to early January.

TABLE 2: Wellington plot assessments. Within each replicate, the most attractive, or least weedy plot scored 1, the second best 2, and so on. These scores were then averaged across all replicates.

A. Committee (Comm) and public assessments at stated dates					
Treat.	Comm 11/12 1990	Public Dec/Jan 1990/91	Comm 28/1/91	Trim mid- Mar	Comm 5/4/91
A1 glyph	2.7	3.2	2.3	1/8	4.3
A2 fatic	3.6*	3.5	3.5	2/8	3.9
A3 flame	3.0*	2.8	4.0	0/4	3.8
A4 Mech	4.0	3.8	4.3	3/4	1.5
B1 glyph	2.4	2.9	2.4	2/7	2.9
B2 trim	1.4	2.8	1.7	4/7	1.7
B3 unt	3.1	2.1	2.9	4/14	2.7

B. Objective assessments				
Treat.	Assessment date		trim mid- Mar	4/4/91
	late Nov/Early Dec	late Dec/Early Jan		
A1 glyph	3.4	1.6	1/8	4.6
A2 faticid	3.9*	3.8	2/8	2.9
A3 flame	2.0*	3.0	0/4	2.8
A4 Mech	3.2	4.8	3/4	1.0
B1 glyph	2.2	1.5	2/7	2.4
B2 trim	1.8	2.4	4/7	1.4
B3 unt	3.0	2.7	4/14	2.7

* untreated at time of assessment. "Trim mid-Mar" refers to the number of plots accidentally mechanically trimmed in mid-March/total number of plots. "A1 glyph" is the mean of glyphosate-treated plots; "A2 fatic" is the mean of fatty acid-treated plots.

In North Shore City, nutgrass was hardest to control and required four to five applications of glyphosate + Pulse or chipping spade each year, and more frequent applications of line-trimmer, fatty acid herbicide or infra-red burner.

Costs of the different treatments in North Shore City are shown in Table 3. In Wellington City, the average cost of a single spray application is about \$70 per lineal km, or \$140 per km of street. Estimated costs for hand-cutting of road verges and accessways up to 750 mm wide is \$250 per lineal km: for general cutting of road verges up to 1 m wide and 2.5 m high on banks, the cost is \$1628 per km (K.S. Mulholland, pers. comm.).

DISCUSSION

Untreated weed growth can block drains, make asphalt footpaths slippery, break up asphalt and the edge of road seal and enlarge cracks, as well as make the streets unsightly. Glyphosate, the standard herbicide used in most urban areas, gave the best and most economic weed control. The alternative methods of weed control often suggested - mechanical methods, flame weeding and 'environmentally-friendly' herbicides - did not give such good weed control and some of them were unpleasant

or dangerous at times. All of them were much more expensive. Alternative methods of applying available herbicides, such as the 'Expedite' system, may overcome some public objections to current herbicide practices.

TABLE 3: Costs per lineal km of treatments in North Shore City.

Treatment	Cost one treat. (\$/km)	At medium weed control level	
		Applications/yr.	Total cost/km
1. Infra-red weed burner	79	4	\$1217
2. Line trimmer + chipping spade	392	3	\$1176
3. Mechanical edger	225	not recommended	
4. Glyphosate + Pulse	102	2	\$204
5. Yates fatty acid herbicide	263	4	\$1051
6. Safers fatty acid herbicide	703	4	\$2811

ACKNOWLEDGEMENTS

Wellington and North Shore City Councils for funding this research, carrying out some treatments and allowing the results to be published here. Tony Ingle for applying some of the treatments. Mary Sheridan and her girls at Wellington Girls College for helping in data collection. Paul Newton, Colin Bell and Elaine Glasgow for helping with assessments.

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