MULCHES AND FATTY ACID HERBICIDES FOR THE CONTROL OF FISHTAIL OXALIS

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Keywords: weed control, *Oxalis latifolia*, fatty acid herbicides, soft soap herbicides

Fishtail oxalis (*Oxalis latifolia*) is a widespread and pernicious weed of cultivated and waste ground. It reproduces by bulbs which can grow from a depth of 300 mm and can lie dormant in the soil for several years. Viable seed is not set in New Zealand. Control, even with translocated herbicides, is difficult (Cox and Kerr 1981). The experiment described here was begun as part of the MAF Agroecology Programme, when fatty acid or soft soap herbicides were thought to have a possible place in 'organic' or low input horticultural systems. Earlier experiments had shown oxalis foliage to be particularly susceptible to fatty acid herbicides, with leaves turning orange or brown within a few minutes of spraying, and later dying.

A site where fishtail oxalis grew very vigorously at the Levin Research Centre was selected for the trial. In August 1990 the site was sprayed with clopyralid (Versatill) at 0.3 kg/ha to control clover and in September 1990 with glyphosate (Roundup) at 2.2 kg/ha to control remaining weeds while the oxalis was still dormant. In October, the site was rotary hoed, which helped to distribute the oxalis bulbs evenly over the area.

Plot size was 1 x 1.5 m. The five treatments, arranged in a randomised complete block with six replicates, were:

1. Mulch of heavy duty black polythene
2. Mulch of weed control matting
3. Fatty acid herbicide (Yates Greenscape), applied at 50 ml/litre, 17.5 kg/ha
4. Fatty acid herbicide (Watkins/Safer's Topgun), applied at 85 ml/litre, 15.3 kg/ha
5. Untreated

The two mulch treatments were imposed in November 1990 and the fatty acid herbicides were applied nine times between mid-December 1990 and mid-April 1991 and six times in the second season, between early November 1991 and late March 1992. Herbicides were applied at rates given, using a modified "Mesto" knapsack sprayer with two fan nozzles operating at a pressure of 200 kPa and delivering 500 litres/ha. Taller, summer-growing weeds were controlled with a 'weed-eater' blade in January or February of each year. Winter-growing weeds were controlled by spraying glyphosate at 2.2 kg/ha in June of each year.

Dormant oxalis bulbs were counted after one year's treatment, in spring 1991, and after two years' treatment, in spring 1992, by taking soil cores. In 1991, three 2.5 cm diameter cores were taken to a depth of 12 cm from each plot, and in 1992, two 7.6 cm diameter cores to 12.5 cm. Bulbs were sieved out, counted in size groups (large, medium or small) and weighed.

Data were analysed by analysis of deviance with a Poisson error model, using Genstat generalised linear regression. This analysis gave predicted treatment means and 95% confidence limits. Confidence limits may have about a one-third overlap and still represent significant treatment differences.

Results are shown in Table 1. After one year's treatment, in spring 1991, multiple applications of neither herbicide had significantly reduced total bulb numbers below those in untreated plots. Both mulch treatments had reduced bulb numbers below those in untreated plots. Bulb weights (not shown here) followed the same trends, with most of the bulbs in the mulched plots small, no large bulbs at all and very few medium-sized ones.

Proc. 48th N.Z. Plant Protection Conf. 1995: 333-334

TABLE 1: Mean of total numbers of fishtail oxalis bulbs/m² following one (Spring 1991) and two years' (Spring 1992) treatment.

Treatments	Spring 1991			Spring 1992		
Black polythene mulch	1567	(462	5320) ¹	253	(29	2188)
Weed matting mulch	627	(93	4221)	361	(59	2208)
Fatty acid (Greenscape)	7104	(3968	12718)	7904	(5351	11673)
Fatty acid (Topgun)	6059	(3229	11372)	6153	(3957	9568)
Untreated	6582	(3595	12051)	12920	(9514	17546)

¹ Upper and lower 95% confidence limits.

After 2 years treatment, in spring 1992, the mulch treatments had reduced bulb numbers even further. Again, there were no large bulbs and very few medium-sized ones. At this stage, both herbicide treatments had reduced bulb numbers (and weight) below those in untreated plots ($P < 0.01$) but not below the 1991 level, with no difference between effectiveness of the two herbicides. Numbers of medium and large bulbs were reduced by the herbicide treatments, although numbers of small bulbs were unaffected.

Despite the rapid and effective kill of oxalis foliage by the two herbicides, even frequent spraying failed to give any measurable reduction in bulb numbers. Mulches of either heavy-duty black polythene or weed matting were effective in reducing bulb numbers to 2 or 3% of those in untreated plots. If fishtail oxalis is a problem for horticultural growers, black polythene or weed mat gives very good control by excluding light and exhausting food reserves in the bulbs. Such treatments would be acceptable under organic production standards.

REFERENCE

- Cox, T.I. and Kerr, R.M., 1981. *Oxalis latifolia* control programmes with oxadiazon and glyphosate. *Proc. 8th Asian-Pacific Weed Science Soc.*: 231-234.