WEED CONTROL FOR FIELD-BUDDED ROSES

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Abstract. A range of residual herbicides and a straw mulch were applied to newly planted *Rosa dumetorum* 'Laxa' rootstocks Visible damage in the form of leaf scorch was seen following applications of oxadiazon (Ronstar liquid) and a transient chlorotic leaf blotching was seen after applications of diflufenican plus isoproturon (Javelin) The best weed control was given by oxadiazon (Ronstar) plus simazine (Simazine 50 FL). Good weed control was also given by straw mulch, atrazine plus terbuthylazine (Gardoprim A 500 FW) plus metazachlor (Butisan S), simazine plus metazachlor, metazachlor plus isoxaben (Flexidor) plus propyzamide (Kerb 50W), and oxadiazon (Ronstar) plus diflufenican plus isoproturon (Javelin)

INTRODUCTION

The residual herbicides, atrazine and simazine, were first marketed by J.R. Geigy S.A., (now Ciba-Geigy), in the late 1950s and have been widely used by U.K. rose growers since the 1960s. Rose crops usually receive three applications of residual herbicide. after planting, after budding, and after heading back. Simazine has a lower water solubility than atrazine and has, therefore, been favoured for use on light land where root uptake of atrazine has led to crop damage. On heavier soils, atrazine has proved safe on roses and its contact activity against small annual weeds has been a boon to growers where there has been a delay between planting and residual herbicide application.

Tolerance of the triazine herbicides, the group that contains atrazine and simazine, by weeds that were previously susceptible, first appeared in the United States in the mid-1960s (3) By the early 1980s incidents of triazine-tolerant *Senecio vulgaris* (groundsel) and *Poa annua* (annual meadow grass) were reported from various locations in the U.K. Triazine-tolerant *Senecio vulgaris* is now fairly widespread and, in common with producers of fruit and other field ornamentals, rose growers have had to seek alternatives to triazines alone. The Dutch intend to discontinue using triazine herbicides in 1991 for environmental reasons (1). If, in the future, a similar approach is taken in the U.K., rose growers will need replacements for triazines rather than, as is currently popular, triazines used in combination with other non-triazine residual herbicides This trial screened a range of triazine and non-triazine herbicidal combinations for weed control and, to date, visual phytotoxicity symptoms.

MATERIALS AND METHODS

Rosa dumetorum 'Laxa' rootstocks of 5 to 8mm hypocotyl diameter grade were hand-planted on a heavy loam of the Bishampton series at Pershore College between 26 and 30 March, 1990. The site had previously been a long term grass ley Crop spacing was 20cm in rows 90cm apart. The stocks had been overwintered in an open frame and were at an advanced bud burst stage at planting. The crop was earthed up manually following planting and irrigated to aid establishment.

Treatments. The following herbicidal treatments were applied on 11 April in dull, calm weather. No irrigation was applied following treatment application.

1. Atrazine applied as Gesaprim 500 FW at 3.4 litres/ha.
2. Oxadiazon and diflufenican plus isoproturon applied as Ronstar liquid at 4 litres/ha, plus Javelin at 2 litres/ha.
3. Oxadiazon and diflufenican plus isoproturon applied as Ronstar liquid at 4 litres/ha, plus Javelin at 1 litres/ha.
4. Oxadiazon and simazine applied as Ronstar liquid at 4 litres/ha, plus Simazine 50 FL at 3.4 litres/ha.
5. Untreated Control.
6. Untreated Control.
7. Simazine and metazachlor applied as Simazine 50 FL at 3.4 litres/ha plus Butisan S at 2 5 litres/ha.
8. Pendimethalin and matazachlor applied as Stomp 330 at 6 litres/ha plus Butisan S at 2.5 litres/ha.
9. Propyzamide and metazachlor applied as Kerb 50 W at 1.7 kg/ha plus Butisan S at 2.5 litres/ha.
10. Atrazine plus terbuthylazine and metazachlor applied as Gardoprim A 500 FW at 5 litres/ha plus Butisan S at 2.5 litres/ha.
11 Isoxaben, propyzamide and metazachlor applied as Flexidor at 0.25 litres/ha, Kerb 50 W at 1.7 kg/ha plus Butisan S at 1 25 litres/ha.
12. Wheat straw mulch at 7.5 cm depth, equivalent to 18.5 T/ha, topdressed with additional ammonium nitrate at 300 kg/ha.

With the exceptions of treatments 4 and 11, oxadizaon (Ronstar liquid) plus simazine (Simazine 50 FL), and isoxaben, (Flexidor), propyzamide (Kerb 50 W) plus metazachlor (Butisan S), all formulations were applied separately. Treatments 4 and 11 were applied as fresh tank mixes All applications were made by knapsack sprayer in 830 litres/ha water equivalent

RESULTS

A foliar scorch was recorded on the three treatments that had combinations containing oxadiazon (Ronstar liquid). This persisted

until late May after which recovery appeared to be total. The two treatments containing diflufenican and isoproturon (Javelin) produced a chlorotic blotching on new crop foliage. This symptom was more severe on plots treated with Javelin at 2 litres/ha than those treated at 1 litre/ha. The chlorotic blotching was associated with an apparent reduction in early growth but foliage symptoms did not persist after 21 June. Subsequent crop growth was good. Results of weed counts are shown in Table 1.

No other treatment produced visible phytotoxicity symptoms and all other crop growth suppression appeared to be linked directly to the level of weed infestation.

DISCUSSION

The weed spectrum was typical of the area except for the absence of *Stellaria media* (common chickweed).

Triazine tolerant weeds were not apparent on the area. All of the herbicidal treatments gave good weed suppression in comparison with the untreated control. The performance of oxadiazon plus simazine (Ronstar liquid plus Simazine 50 FL), atrazine plus terbuthylazine, and metazachlor (Gardoprim A 500 W plus Butisan S), and the straw mulch was outstanding.

The combination of oxadiazon and simazine had performed well in an earlier trial at Luddington Experimental Horticulture Station* and, at present, has a label recommendation for application to established dormant roses.

Atrazine plus terbuthylazine (Gardoprim A 500 FW) are both triazines. Gardoprim A 500 FW would not be effective against triazine tolerant weeds and would be lost if triazine herbicides were to be withdrawn. Gardoprim A 500 FW at 5 litres/ha applies 2.5 kg/ha triazine, a substantially higher rate than is recommended for atrazine or simazine formulations approved for roses. For this reason, although no crop damage was recorded at Pershore, growers would be unwise to treat large areas of roses with a herbicidal combination containing Gardoprim A at 5 litres/ha until its crop safety has been fully evaluated.

The straw mulch was very successful for weed suppression and did not visibly affect crop growth. Like the chemical herbicides it did not limit perennial weed growth and where *Cirsium arvensis* (perennial thistle) was present as vegetative material the straw

*Part of Ministry of Agriculture, Agricultural Development and Advisory Service, now closed

Table 1. Weed count per two sq metres, 20 July

Weed Species	1 Atrazine	2 Ronstar + Javelin at 2 l/ha	3 Ronstar + Javelin at 1 l/ha	4 Ronstar + Simazine	5 Untreated Control	6 Untreated Control	7 Simazine + Butisan S	8 Stomp + Butisan S	9 Kerb 50W + Butisan S	10 Gardoprim A + Butisan S	11 Butisan S + Flexidor + Kerb 50W	12 Straw Covered
Calystegia sepium	9				4	1		16			2	
Capsella bursa-pastoris					19	7			1			
Cerastium holosteoides						1						
Chamomilla suaveolens					19	19						
Chenopodium album	25	22		34	484	555	10	22	22	2	12	
Chenopodium polyspermum						236			1			
Coronopus didymus	2		4		9	11			4			
Epilobium montanum									1			
Euphorbia helioscopica								2				
Fumaria officinalis					7	3			3			
Galinsoga quadriradiata			9		3							
Galium aparine								5			1	
Lactuca serriola											1	
Lamium purpureum			1									
Matricaria perforata					124	135		2	1			
Plantago major					1	30			1			
Poa annua			1									
Polygonum aviculare	8		4		31	26	1		10		2	
Polygonum persicaria			2		5	746			1	1		
Raphanus raphanistrum					3							
Rumex obtusifolius						1						
Senecio vulgaris			1		1	1			1			
Solanum nigrum	5	12	9		11	14	3	1	6		5	1
Sonchus arvensis	5		1		31	20			2		2	
Trifolium repens					1	4			1			
Urtica urens	1					22			5		5	1
Veronica chamaedrys	1		2		6	16						
Vicia tetrasperma						4		1				

presented no barrier. The forthcoming end to the practice of straw burning could, in some areas, increase the availability and reduce the price of straw. The straw used in the trial hampered the budding process, this being mainly due to the problem of hoeing out the earthed-up crop. Successful commercial application of a straw mulch for weed suppression on roses will probably depend on the following five factors:

i) Wide availability at a farm gate price of less than £2.50/T.

ii) Acceptable mechanised straw laying methods.

iii) A better understanding of the likelyhood of nitrogen starvation from straw breakdown affecting the crop. Economically and environmentally acceptable methods of countering progressive nitrogen starvation.

iv) Elimination of volunteer cereals in straw mulches.

v) Effective small rodent control in straw.

With the exception of the straw, the most effective triazine-free herbicidal combinations were oxadiazon (Ronstar liquid) and isoproturon plus diflufenican (Javelin). The reduction of the rate of Javelin from 2 litres/ha to 1 litre/ha adversely affected the combination's performance. This was disappointing because the chlorotic leaf blotching on the crop was also much less severe at the lower rate. The metazachlor, isoxaben and propyzamide (Butisan S, Flexidor and Kerb 50W) gave good results although earlier work at Luddington EHS had indicated that reduced rates of Butisan S could give a shortened period of protection. For this reason such a combination may require summer "topping up", even in a non-earthed up crop. Napropamide (Devrinol) was not included in this trial because earlier work had indicated it to be a far better herbicide for winter (post heading back) application than for late spring use without subsequent irrigation (2).

LITERATURE CITED

1 Flaherty, A 1990 Crop protection What Holland can and cannot use *Grower*, August 9 114 No 6 11

2 Horticultural Development Council, 1989 *Hardy Nursery Stock Project News* No 8, November 11

3 Putwain, P D 1982 Herbicide resistance in weeds—An inevitable consequence of herbicide use? *Proc British Crop Protection Conference*, 2 719-727