SELECTIVITY OF SETHOXYDIM MIXTURES TO VINE CROPS AND SHELTER TREE SPECIES

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SUMMARY

Sethoxydim was applied alone and in mixture with several foliar and soil-residual broadleaf herbicides over establishing kiwifruit, grapes and shelter trees species. Sethoxydim alone and in mixture with either simazine, diuron, amitrole-T or clopyralid was well tolerated by both grapes and kiwifruit. Mixtures with simazine and clopyralid were also safe over shelter tree species, but mixtures with diuron or amitrole-T caused damage to most shelter species.

INTRODUCTION

The properties of sethoxydim and its activity as a post emergence selective grasskiller in onions and broadleaf crops have been described by Naish *et al* (1982). Because of the wide range of potential uses in both annual and perennial broadleaf crops, it was considered desirable to identify the effectiveness and compatability of a range of broadleaf herbicides which could be tank-mixed with sethoxydim to provide broad-spectrum selective weed control.

Earlier screening trials (unpublished data) have shown nursery seedlings or cuttings of grapes, apples, peaches, kiwifruit and several shelter tree species were highly tolerant to sethoxydim at dosages sufficient to control a wide range of annual and perennial grasses.

This paper reports a trial to assess tree and vine crop tolerance to sethoxydim applied alone and in mixture with amitrole-T, clopyralid, diuron and simazine. Diuron and simazine were selected to have potential in earlier tolerance trials on kiwifruit (Cox 1980; Wilson 1980, 1982a) or other tree and vine crops (Anon 1981, Cox 1982).

'Bruno' kiwifruit, 'Grey Reisling' grapes and the shelter species matsudana willow (*Salix matsudana*). 'Flevo' poplar (*Populus x euramericana* 'Flevo'), Japanese cedar (*Cryptomeria japonica*) and casurina (*Casurina cunninghamiana*) were tested.

METHOD

The trial was established in bare ground at Waireka Research Station. Matsudana willow and 'Flevo' poplar cuttings 30 cm long were planted on 29 July 1982; bare rooted Japanese cedar 25 cm high were planted on 3 August 1982, and casurina as 'Rootainer' pot-grown plants 25 cm high were planted on 6 August 1982. Seven plants of each species were established per plot. Five kiwifruit and seven grapes per plot were planted on 13 August 1982 as one-year-old rooted cuttings. The trial was of a randomised complete block design of 3 replicates with individual plot size of 2.5 x 5 metres.

Spray applications were made on 7 October 1982 with a modified Oxford precision sprayer and hand-held boom applying 200 litres/ha total spray volume through Tee-Jet 730154 nozzles operated at 200 kPa. All spray treatments included 1% by volume of a non-phytotoxic emulsifiable paraffinic oil and a polyvinyl polymer drift control agent. Spray applications were broadcast with no attempt made to protect young foliage from full coverage. At treatment all species except casurina were in active spring growth and broad-leaved species had a minimum of four fully expanded new leaves.

Hand weeding was done as required throughout the season.

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Visual assessment of tolerance was made by two independent observers 3 weeks after treatment using a rating scale where 10 = no effect and 0 = complete defoliation or dieback. Height and survival of all species was recorded 6 months after treatment.

RESULTS

Tolerance, survival and heights of kiwifruit, grapes and shelter tree species are summarised in Table 1.

Sethoxydim at both rates alone or in mixture with clopyralid had essentially no visual effect on grapes and caused slight temporary leaf cupping on kiwifruit. Mixtures with simazine caused no visual effect on grapes and slight chlorosis on kiwifruit. The effect with the mixtures of sethoxydim and diuron on grapes and kiwifruit were similar but more severe on kiwifruit as indicated by the low visual score (Table 1). The mixture of amitrole-T and sethoxydim caused slight temporary leaf whitening on grapes and blotchy whitening and/or anthocyanin pigmentation on kiwifruit. None of the herbicide mixtures of sethoxydim alone affected survival or growth, as expressed by height of kiwifruit or of grapes. There was a trend for improved growth with the herbicide mixtures compared to untreated which may be attributed to inadequate hand weeding.

TABLE 1: Tolerance, survival and heights of tree and vine crops.

Treatment	Kg ai/ha	kiwifruit T* Ht (cm)	grapes T* Ht (cm)	Matsudana T*Ht (cm)	'Flevo' T* Ht (cm)	Japanese Ht survival (cm) (%)	Casurina Ht (cm)
sethoxydim	1	9.3 130	10 70	7.7 147	8.3 154	44 100	110
sethoxydim	1.5	9.0 111	9.3 79	7.2 177	8.7 196	56 100	111
sethoxydim + diuron	1 + 3.2	3.3 120	6.5 91	2.0 128	5.3 145	41 72*	75*
sethoxydim + diuron	1.5 + 3.2	5.3 111	7.8 75	1.2 149	3.0 166	36 76*	64*
sethoxydim + diuron	1.5 + 1.6	3.8 99	7.5 88	1.7 153	4.8 164	39 91	69*
sethoxydim + simazine	1 + 3	8.0 136	9.8 97	8.0 155	7.3 161	53 100	123
sethoxydim + simazine	1.5 + 3	7.8 172	9.8 90	6.7 206	8.3 206	79 100	103
sethoxydim + simazine	1.5 + 1.5	8.5 171	9.7 92	8.0 218	9.0 213	71 100	113
sethoxydim + clopyralid	1 + 0.3	9.0 177	9.8 105	7.5 172	8.0 212	67 100	103
sethoxydim + amitrole T	0.5 + 2	5.3 117	6.5 74	4.5 10*	4.8 97*	33 100	86
sethoxydim + amitrole T	1.0 + 2	5.3 117	7.2 81	4.7 0*	4.8 74*	30 100	73*
untreated		9.0 99	9.8 69	9.3 158	9.8 199	55 100	108
LSD (5%)		NS	NS	49	80	28	32

T* = Tolerance

Chemicals used:

sethoxydim — Alloxol-S

diuron — Karamex

simazine — Simazol 5A

amitrole-T — Weedazole 4L

clopyralid — IWD 3523

On shelter species the only effect of sethoxydim at either rate, or in mixture with simazine or clopyralid, was slight necrosis of leaf margins. The mixtures of sethoxydim with diuron caused lower leaf defoliation of matsudana willow and 'Flevo' poplar, from which recovery was rapid with no long-term effect on survival or growth. This mixture caused initial chlorosis and reduced height on casurina and some mortality of Japanese cedar. The mixtures of sethoxydim with amitrole-T caused defoliation of the deciduous species and pronounced leaf chlorosis and/or necrosis on Japanese cedar. On casurina the effect was a chlorotic striation of the stem internodes. All matsudana willows were either killed or severely checked and 40% of 'Flevo' poplar plants were killed with significant height reduction of surviving plants.

DISCUSSION

The results obtained under the conditions of this trial represent a severe test of herbicide tolerance, as in each case treatments were broadcast over tender new foliage with no attempt to protect any species from full coverage. Furthermore the deciduous shelter species were established from cuttings which have been reported to be more sensitive to herbicides than rooted plants (Cox 1982).

Sethoxydim applied alone was well tolerated by all species tested. Where slight leaf burn occurred it was temporary and was considered to be primarily induced by a combination of spray adjuvant included with all spray treatments, and a severe wind which caused mechanical damage throughout the trial 10 days after spray application. Where herbicide mixture damage did occur, it is considered that it was due to the broadleaf component of the mixture *per se* or its combination with the crop oil rather than to sethoxydim.

Of all the herbicide combinations tested the mixtures of sethoxydim with either simazine up to 3 kg ai/ha or clopyralid 0.3 kg ai/ha were well tolerated by all species. While both Cox (1980) and Wilson (1982a) found simazine damaging to seedling kiwifruit this result is consistent with Wilson's (1982b) conclusion that kiwifruit tolerance to herbicides increases considerably in the first 2 years of the plant's growth. The use of diuron in combination with sethoxydim caused moderate to severe foliar damage on all species tested but did not affect ultimate growth of either vine crops or deciduous trees. Tolerance of casurina and Japanese cedar however was inadequate. Cox (1982) reported little damage to these species from soil application of diuron so this study highlights the potential for damage by foliar uptake of diuron particularly in the presence of adjuvants.

Grapes and kiwifruit were remarkably tolerant to the mixture of sethoxydim and amitrole-T, whereas the shelter species were quite susceptible. Japanese cedar and casurina may tolerate directed applications of mixtures containing amitrole-T but matsudana willow and 'Flevo' poplar cuttings appear too sensitive for such a treatment in the year of planting.

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