CONTROL OF WILD RADISH IN LUPIN CROPS USING THE HERBICIDE DIFLUFENICAN

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Summary. From experiments conducted by Rutherglen Research Institute over three seasons it was found that two treatment combinations of simazine plus diflufenican were consistently effective in reducing wild radish, *Raphanus raphanistrum* L. plant populations in lupin crops. These treatments were i) simazine 2 kg a.i. ha^{-1} plus diflufenican 100 g a.i. ha^{-1} applied just after sowing, and ii) simazine 2 kg ha^{-1} applied just after sowing followed by diflufenican 100 g ha^{-1} applied early post-emergence. These two treatments significantly ($P = 0.05$) reduced wild radish numbers each season resulting in significantly ($P = 0.05$) increased lupin grain yields. These two treatment combinations also gave better control of wild radish than either component alone, although differences were not statistically significant in all comparisons.

INTRODUCTION

Wild radish is often a problem weed in wheat cropping regions of Australia (2). In many of these regions lupins are grown in rotations with wheat (3). If wild radish occurs in lupin crops, large reductions in grain yield can occur due to the highly competitive nature of this weed. Ideally, wild radish should be removed from the lupin crop using a selective herbicide. However, simazine and the other herbicides registered for use in lupin crops do not satisfactorily control wild radish. The resulting infestations of wild radish can cause lupin grain yield reductions and can also cause problems with harvesting and storage due to contamination of grain with green wild radish seeds. In addition, wild radish plants surviving in lupin crops will often produce large quantities of seed, therefore exacerbating problems in following crops (1).

It is important, therefore, that wild radish be well controlled in lupin crops, not only to increase lupin productivity, but also the productivity of following crops.

A large number of herbicides have been evaluated over several seasons in an attempt to find an effective herbicide for the control of wild radish in lupins (Code, unpublished data). Although several herbicides gave promising results they were either too expensive (e.g. metribuzin, linuron, propazine), or were marginal in safety to lupins (e.g. atrazine). In more recent, experiments (1984-1986), a new herbicide, diflufenican [(N-2,4-difluorophenyl)-2-(3-trifluoro methylphenoxy)-3-pyridine carboxanide] was effective in controlling wild radish when applied either pre or post-emergence in lupins. In this paper we report results from these experiments comparing the use of diflufenican either alone, or with simazine.

METHODS

The experiments were conducted over three seasons (1984-1986) on farms in the Rutherglen district with known heavy infestations of wild radish.

In each season the site was sprayed with a knockdown herbicide to control weeds present before sowing. Seed of lupin cv. Uniharvest was inoculated and direct-drilled in mid to late April using an 8 row drill fitted with narrow

points. The seed was sown at 100 kg ha^{-1} with superphosphate (11.4 kg P ha^{-1}).

Plot size was 1.6 by 12-16 m with treatments applied in a randomised block design with three or four replicates.

All herbicides were applied using a two metre hand-held boom delivering approximately 80 L ha^{-1}. The herbicides and the rates at which they were used are given in Table 1. Pre-emergence treatments were applied within two weeks after sowing. Diflufenican applied post-emergence after simazine was sprayed 22 weeks (1984), 12 weeks (1985) or 16 weeks (1986) after sowing. Wild radish at this time was at the four to ten leaf stage. Diflufenican without a prior simazine application was sprayed 13 weeks (1984), 5 weeks (1985) or 10 weeks (1986) after sowing. Wild radish was at the cotyledon to eight leaf stage.

Wild radish plants were counted in spring in 25x25 cm quadrats per plot. Plots were machine harvested in December for grain yield.

RESULTS AND DISCUSSION

The results in Table 1 show that all the herbicide treatments significantly (P = 0.05) reduced wild radish plant density below that of the control in all three years. Additionally these herbicide treatments, except for 100 g ha^{-1} diflufenican applied early post-emergence, significantly increased the lupin grain yield in all three years. Yields with diflufenican applied post-emergence were probably effected to some extent by the presence of annual grass weeds controlled in other treatments.

Table 1. Effect of herbicide treatments on wild radish populations and lupin yields 1984-1986

Treatment	Time of application	Wild Radish (plants m^{-2})			Lupin grain yield (t ha^{-1})		
		1984	1985	1986	1984	1985	1986
Control		84	32	110	0.17	1.14	0.70
Simazine 2 kg ha^{-1}	pre[a]	34	10	74	0.79	1.75	1.18
Diflufenican 100 g ha^{-1}	pre	21	4	17	0.90	1.97	1.49
Simazine 2 kg ha^{-1} + diflufenican 100 g ha^{-1}	pre	na[a]	2	0	na	1.92	2.80
Simazine 2 kg ha^{-1} diflufenican 100 g ha^{-1}	pre post[a]	13	2	6	0.70	1.89	2.49
Diflufenican 100 g ha^{-1}	post	16	17	10	0.70	1.42	1.39
l.s.d. (P = 0.05)		28	7	22	0.26	0.58	0.42

[a] Pre = applied post-sowing, pre-emergence
Post = applied post-emergence
na = not applied

The two most effective herbicide treatments in reducing wild radish plant density were i) simazine 2 kg ha^{-1} plus diflufenican 100 g ha^{-1} applied just after sowing, and ii) simazine 2 kg ha^{-1} applied just after sowing followed by diflufenican 100 g ha^{-1} applied early post-emergence. These two treatments produced the lowest wild radish plant counts in each year they were applied. These two combinations of diflufenican and simazine are more effective in controlling wild radish than when either herbicide is used alone at the same rates and times of application (differences are significant with some comparisons only). The effect on lupin grain yield produced by the simazine and diflufenican combinations is most evident in the 1986 results. In this season there was a heavy infestation of wild radish and the large reductions in plant density by the simazine and diflufenican combinations, produced by far the largest yields.

The difference in the two treatments, outlined above is that the first is believed to be more effective in controlling wild radish plants germinating earlier in the season, while the second is more effective in controlling later germinations. It is believed that these two treatments would provide successful on-farm control of wild radish in lupin crops.

REFERENCES

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