CHEMICAL CONTROL OF JERSEY CUDWEED (*GNAPHALIUM LUTEO-ALBUM*) IN ASPARAGUS

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SUMMARY

Herbicides belonging to different chemical groups were evaluated in two field trials for control of Jersey cudweed (*Gnaphalium luteo-album*) in asparagus. Glyphosate, glufosinate-ammonium and paraquat were effective in removing the existing infestation but re-invasion by seedlings occurred. They also caused short term crop damage. Amitrole gave satisfactory control and dicamba was partially effective, but new plants germinated in both treatments. Among the residual herbicides tested diuron with amitrole or linuron were the most effective while simazine was ineffective. Diuron applied pre-harvest or at 'close up' appears the best strategy for long term control. Addition of a knockdown material would be necessary to remove existing plants.

INTRODUCTION

Most asparagus crops in New Zealand traditionally have bare ground between the rows. This system relies heavily on the use of selective herbicides with a long residual life in the soil (Rahman 1986), because cultural weed control measures can usually take place only at close up or over the winter period after the ferns have been cut down. A weakness of this system is the potential for invasion of weeds that are tolerant of these chemicals.

Jersey cudweed has recently become a problem in many asparagus crops in the Waikato and Hawkes Bay regions. Observations by growers and consultants have shown that its invasion and spread into asparagus blocks has been swift and spectacular, covering large properties in two or three seasons following its initial appearance. One of the major factors contributing to its spread is its high tolerance to bromacil (Matthews 1975) and probable tolerance to terbumeton/terbuthylazine, the commonly used long term residual herbicides in asparagus.

Jersey cudweed is an annual to perennial native plant growing up to 50 cm tall. It can be sparingly to much branched and is distinguished by a leaf covering of white to greyish cottony dense hairs (Allan 1961). It is normally a weed of waste places and is distributed throughout New Zealand in coastal to montane open places and grassland. Because of its fast growth and ability to spread it can be very competitive at high densities and can also interfere with spear harvesting. The objective of this research was to evaluate a number of herbicides for selective control of Jersey cudweed in asparagus.

MATERIALS AND METHODS

The trial site was an established block of asparagus (cv. N.Z. Beacon) on a Horotiu sandy loam soil at Arapuni in the Waikato. It had received a pre-emergence treatment of terbumeton/terbuthylazine (Caragard 500 FW) at 5 kg/ha in September 1989. The cudweed infestation had been present for at least two growing seasons and was reasonably uniformly distributed throughout the block.

This investigation included two field trials conducted at the same site but at two different growth stages of the weed. Trial 1 was on an infestation established over the winter in an area that had not been cultivated. The plants were branched, up to 15 cm tall and actively growing at the time of application. Treatments applied on 27.10.89 are listed in Table 1. The more promising of these herbicides were used in the second trial later in the season.

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Trial 2 was conducted on a more mature stand of cudweed which had established after the winter cultivation, and was up to 30 cm tall and starting to flower. The plants were well branched and the infestation was fairly dense and uniform over most of the trial. The herbicides were applied on 11.12.89 at the close up stage of the crop.

Individual plots were 4 m^2 in Trial 1 and 6 m^2 in Trial 2. Treatments were replicated four times in a randomised block design. The herbicides were applied with a CO_2 powered precision sprayer in 200 litres/ha of water at 200 kPa.

Visual assessments of weed damage and control were made at 1, 3 and 6 weeks after treatment (WAT) in Trial 1 and 2, 6 and 12 WAT in Trial 2. The seedlings germinating in Trial 2 were also counted in two 1 m^2 areas from each plot 12 WAT. Injury to asparagus was visually assessed in both trials 1 WAT.

RESULTS

Trial 1

The fastest acting treatments were the non residual herbicides glufosinate-ammonium (Buster), paraquat (Gramoxone) and glyphosate (Roundup). Addition of Pulse surfactant further increased the speed of activity of glyphosate. By 3 WAT all three herbicides had given nearly complete control (Table 1). Some live stems remained in the paraquat treated plots, however, and the control level had dropped to an average of 85% by 6 WAT.

The combinations of diuron and linuron (Cohort) and diuron (Kamex) + amitrole (Weedazol 4L), although slow, were effective in eliminating the seedling cudweed. Addition of simazine (Gesatop 500 FW) assisted paraquat and amitrole to control the few surviving plants. Dicamba (Banvel), clopyralid (Versatill) and the two sulfonylurea herbicides, metsulfuron (Escort) and tribenuron-methyl (Express) did not provide satisfactory control of Jersey cudweed (Table 1). Clopyralid was the least effective of the herbicides used.

TABLE 1: Effect of herbicides on young Jersey cudweed plants and asparagus spears (treated 27.10.89).

Herbicide	Rate (kg ai/ha)	Jersey cudweed control (%)			Live stems (%)	Asparagus injury (%)
		1 WAT*	3 WAT	6 WAT	6 WAT	1 WAT
glyphosate	2.2	74	100	100	0	59
glyphosate + Pulse	2.2 + 0.2%	90	100	100	0	60
glufosinate-ammonium	1.5	94	100	100	0	34
paraquat	0.6	83	99	85	3	60
amitrole	4.0	0	54	99	1	21
simazine + amitrole	2.0 + 4.0	1	49	100	0	29
simazine + paraquat	2.0 + 0.6	85	99	100	0	50
diuron + amitrole	2.0 + 4.0	29	100	100	0	30
diuron + linuron	1.7 + 1.1	48	100	100	0	25
dicamba	0.4	26	46	95	10	8
clopyralid	0.3	18	19	20	100	10
metsulfuron	6.0g	8	39	90	46	73
tribenuron-methyl	22.5g	5	28	90	78	45
S.E.D. (0.05)**		10.3	7.0			8.5

* Weeks after treatment.

** Excluding data values of 0 and ⩾99.

Trial 2

The relative effectiveness of herbicide treatments on mature Jersey cudweed was similar to that observed in Trial 1. Amitrole, simazine + amitrole and dicamba were slower acting than other treatments but by 6 WAT all treatments except dicamba had given complete kill of mature plants (Table 2).

A count of seedlings 12 WAT showed substantial invasion of new plants in plots treated with non residual herbicides. Addition of simazine to paraquat or amitrole did not reduce the number of seedlings invading these plots. The best residual control of cudweed, with little or no subsequent seedling growth was provided by combinations of diuron with linuron or amitrole (Table 2).

Asparagus injury

All herbicides caused some injury to the crop when applied during the cutting season (Table 1). However, except for the sulfonylurea herbicides this damage was temporary (2-3 weeks) in most cases. The three non residual herbicides were also damaging in the second trial to spears which received the spray. The residual herbicides and their combinations caused minimal injury to the asparagus crop when applications were made at close up (Table 2). Of the herbicides tested, only clopyralid is registered for use in asparagus during the cutting season.

TABLE 2: Effect of herbicides on mature Jersey cudweed, emergence of cudweed seedlings, and asparagus spears (treated 11.12.89).

Herbicide	Rate (kg ai/ha)	Jersey cudweed control (%)		Seedlings /m²	Asparagus injury (%)
		2 WAT	6 WAT	12 WAT	1 WAT
glyphosate	2.2	89	100	43	65
glyphosate + Pulse	2.2 0.2%	91	100	63	66
glufosinate-ammonium	1.5	78	100	35	35
paraquat	0.6	71	100	55	18
amitrole	4.0	24	100	15	1
simazine + amitrole	2.0 4.0	29	100	20	4
simazine + paraquat	2.0 0.6	61	100	53	14
diuron + amitrole	2.0 4.0	63	100	3	4
diuron + linuron	1.7 1.1	61	100	0	5
dicamba	0.4	29	90	50	3
S.E.D. (0.05)		3.9		14.5	8.9

DISCUSSION AND CONCLUSIONS

The control of Jersey cudweed appears to be possible with the use of currently available herbicides. The incorporation of some of these herbicides into the existing asparagus weed management programme may, however, present some difficulties. Among the residual herbicides, diuron and possibly linuron provide practical alternatives which could be used as a pre-harvest treatment or applied at the close up stage of the crop. Simazine is not likely to give significant reduction in the infestation of this weed. The plants establishing through the season may be checked or controlled by spot spraying with non residual herbicides or possibly amitrole. Of the other herbicides which could be employed in the asparagus crop, clopyralid appears to be relatively ineffective for control of Jersey cudweed. Dicamba gives only partial control but could be useful for checking its growth if the herbicide is to be sprayed for controlling other weed species. Observations have shown that cultivation is not a likely viable alternative

to chemical control because the plants seem to propagate vegetatively and total removal would therefore be necessary.

As the commonly used residual herbicides in asparagus at present (bromacil and terbumeton/terbuthylazine) do not appear to control Jersey cudweed, the simplest and most economic solution would be to follow the current recommendation of 'rotating' residual herbicides in the asparagus weed management programme (Rahman 1986). Thus use of diuron alone, or in combination with other chemicals, should be considered at least every second or third year to stop the invasion of this weed and/or to control it. In blocks where cudweed is already present, it would be necessary to add a knockdown material with diuron to remove the existing plants, in addition to stopping the invasion of weed seedlings in the crop.

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REFERENCES

Allan, H.H., 1961. Flora of New Zealand, Vol. 1 — Indigenous tracheophyta. R.E. Owen, Govt Printer, Wellington.

Matthews, L.J., 1975. Weed control by chemical methods. MAF Bulletin No. 329. A.R. Shearer, Govt Printer, Wellington.

Rahman, A., 1986. Controlling weeds in asparagus. *N.Z. Farmer 107 (16):* 29-30.