TOLERANCE OF ASPARAGUS AND SENSITIVITY OF SOME WEEDS TO DICAMBA AND CLOPYRALID

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SUMMARY

A study was made of the tolerance of asparagus (*Asparagus officinalis*) to two promising herbicides used for the control of Californian thistle (*Cirsium arvense*). When applied either after 'closing up' in December, or after fern removal in June, neither dicamba nor clopyralid at 0.6 kg ai/ha reduced yield or quality of spears in two successive harvest seasons. Information was gained on the sensitivity of a number of weed species.

INTRODUCTION

Perennial weeds pose a continuing problem in asparagus beds. Current official advisory information warns growers that crops can become uneconomic in a few years if such weeds are not brought under control (Heath 1984).

One of the worst offenders is Californian thistle which often survives initial land preparation from pasture and, assisted by cultivation, spreads during the asparagus establishment period. Dicamba is a herbicide which is known to give reasonable control of this weed (Crafts and Robbins 1962). It is used in asparagus in several North American states (Anon 1985) but has never been approved for this purpose in New Zealand.

Clopyralid also has known activity against Californian thistle (Whitesides and Appleby 1978), and has been tested in New Zealand (Naish 1975). Local trials by Rahman and Sanders (1984) have shown that both dicamba and clopyralid give good control of Californian thistle in asparagus.

Their potential for use in asparagus was sufficient reason to instigate this study on the tolerance of asparagus to these herbicides.

MATERIALS AND METHODS

At the end of the harvest season in early December 1982 a trial was laid down in an area of asparagus, cv. Rutgers Beacon, then in its third season of growth. All spears were removed after the final pick and the four treatments applied the same day were: dicamba (Dicamba 20 AC) and clopyralid (Versatill 30 AC) each at 0.3 and 0.6 kg ai/ha.

These treatments were repeated after fern removal in June 1983. The crop was harvested from mid-September to the end of November 1983.

A similar sequence occurred the next season with treatment applications on the same plots in December 1983 and June 1984 followed by harvest from September to November 1984.

For normal maintenance purposes herbicides were applied over the whole trial area, as follows:—

December 1982: bromacil (Hyvar X 80 WP) 1 kg ai/ha

June 1983: glyphosate (Roundup 36 AC) 2 kg ai/ha

August 1983: simazine (Simazine 80 WP) 0.7 kg ai/ha

plus metribuzin (Sencor 70 WP) 0.3 kg ai/ha

December 1983: bromacil 0.7 kg ai/ha

plus diuron (Karmex 80 WP) 0.4 kg ai/ha

plus glyphosate 1.5 kg ai/ha

August 1984: glyphosate 2 kg ai/ha

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September 1984: diuron 0.8 kg ai/ha
plus metribuzin 0.4 kg ai/ha

Plots were 6 m long, containing 15 plants in single rows 1.5 m apart. Maintenance spraying was carried out with a tractor mounted machine with a 4.5 m boom and treatment herbicides were applied with a propane-pressurised plot sprayer with a hand-held four-jet boom. Fertiliser was applied in June 1983 (carbonate of lime 5.7 t/ha, sulphate of potash 500 kg/ha, urea 150 kg/ha) and again in June 1984 (sulphate of potash 400 kg/ha).

In May 1983, the fern was cut and removed and in May 1984 the fern was mulched using a tractor-mounted machine.

In both seasons, from mid-September to the end of November 1983 and 1984, the harvesting procedure was the same. Spears were picked three times each week for ten weeks and numbers and weights of first and second grade spears were recorded. First grade was defined as spears > 180 mm long, and > 10 mm diameter, without defects; second grade consisted of damaged or diseased spears of the above dimensions and those of a smaller diameter.

Weed species which resisted routine maintenance herbicides were visually assessed in June 1984, three weeks after applying the winter dicamba and clopyralid treatments.

RESULTS AND DISCUSSION

One week after the first set of treatments were applied in December 1982 distorted stems were seen in plots treated with dicamba or clopyralid 0.6 kg ai/ha. No such effect was noted after treatment in December 1983.

As yields were very similar in both seasons, the results of the 1984 harvest only are presented.

The 1984 harvest weights and numbers of first grade spears, which represented 44% and 39% respectively of the totals, are presented in Table 1. In comparison with yields from untreated plots neither dicamba nor clopyralid caused any reduction in yield or quality.

TABLE 1: Effect of herbicides on first grade asparagus yields (1984 harvest).

Treatment kg ai/ha	t/ha	no. spears/crown
Applied in December:		
dicamba, 0.3	2.30	4.77
dicamba, 0.6	2.21	5.00
clopyralid, 0.3	2.44	5.02
clopyralid, 0.6	2.63	5.41
Mean	2.40	5.05
Applied in June:		
dicamba, 0.3	2.22	4.85
dicamba, 0.6	1.98	4.72
clopyralid, 0.3	2.10	4.37
clopyralid, 0.6	2.65	5.71
Mean	2.24	4.94
Untreated	2.39	5.14
LSD 5% between any two treatments	NS	NS
CV%	25.8	24.9

As was intended, the maintenance herbicide programme effectively prevented most weed growth over the whole trial. While weed information was incidental to the main purposes of this investigation, Table 2 records observations made on the sensitivity of certain species to dicamba and clopyralid applied in June 1984. While both herbicides

TABLE 2: Extent of herbicide damage on weeds 3 weeks after spraying in June 1984. XXX severe damage; XX some damage; X slight damage; — not present.

	dicamba	clopyralid
<i>Aphanes arvensis</i>	X	XX
<i>Bellis perennis</i>	XX	XX
<i>Cerastium glomeratum</i>	XXX	X
<i>Cirsium vulgare</i>	XX	XXX
<i>Coronopus didymus</i>	XX	X
<i>Epilobium ciliatum</i>	XXX	XX
<i>Erodium cicutarium</i>	XX	—
<i>Ranunculus repens</i>	XX	XX
<i>Senecio vulgaris</i>	X	XXX
<i>Sonchus oleraceus</i>	XX	—
<i>Stellaria media</i>	XXX	X
<i>Taraxacum officinale</i>	XX	XXX
<i>Veronica persica</i>	X	X

showed some activity against most species, clopyralid had much less effect than dicamba on annual mouse-ear chickweed (*Cerastium glomeratum*) and chickweed (*Stellaria media*). Conversely, dicamba was not as effective as clopyralid against groundsel (*Senecio vulgaris*).

This work confirms that dicamba and clopyralid can be used safely in asparagus beds, consistent with the reported experience of Rahman and Sanders (1984). Both herbicides are known to have activity against Californian thistle and if this and other susceptible weeds warrant special treatment the final choice will depend mainly on economic considerations.

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