

DESTRUCTION OF UNWANTED ASPARAGUS CROPS

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With the ageing of many asparagus beds and escalating land prices, a need is now arising for replanting of the crop or using these fields for other agricultural/horticultural purposes. Asparagus is a very competitive plant in cropping systems and as a contaminant in pastures it may taint milk. Being a robust perennial crop, an established asparagus plant can be extremely difficult to destroy. The research reported here investigated several strategies for the destruction of unwanted asparagus plants.

The treatments investigated the effects of timing of crop removal and the use of different chemical and/or cultural methods (Table 1). Treatments 1, 2, 3, 4 and 6, included rotary hoeing and would allow time to prepare the land for autumn planted crops. Treatments 4 and 5 simulated the effects of extended harvesting, while treatments 7, 8 and 9 tested the efficacy of herbicides applied to the standing fern about two months after closeup. Treatment 10 evaluated the effectiveness of rotary hoeing in winter, when a late decision was made to plant in spring.

The trial was a randomised block design with four replicates, two of which were on cv. Mary Washington with a plot size of 30 m x 2 m (2 rows) and the other two on cv. Rutgers Beacon with a plot size of 18 m x 2 m. Initial rotary hoeing was done with three passes at progressively greater depths to approximately 200 mm. Subsequent rotary hoeings of Treatment 2 were single passes at 200 mm. Fumigation (Treatment 1) was carried out under polythene covers secured at the edges and inflated with air. Methyl bromide was injected onto evaporating pans at 100 g/m².

TABLE 1: Details of treatments used.

Number	Treatment
1	Rotary hoe 22.12.89, three passes down to 200 mm; fumigate (methyl bromide) 100 g/m ² , 6.1.90
2	Rotary hoe 22.12.89, three passes down to 200 mm; repeat 8.2.90, 23.3.90, one pass at 200 mm
3	Rotary hoe 22.12.89, three passes down to 200 mm; new ferns sprayed with glyphosate (Roundup) 12.2.90
4	Extended harvest; rotary hoe 8.2.90, three passes down to 200 mm
5	Extended harvest till April
6	Closeup 21.12.89; rotary hoe 8.2.90, Three passes down to 200 mm
7	Closeup 21.12.89; spray ferns with glyphosate 12.2.90
8	Closeup 21.12.89; spray ferns with metsulfuron (Escort) 12.2.90
9	Closeup 21.12.89; spray ferns with glufosinate-ammonium (Buster) 12.2.90
10	Closeup 21.12.89, winter mulching of ferns 26.6.90; rotary hoe 10.7.90, three passes down to 200 mm

The covers were removed 48 hours later. Treatments 4 and 5 were 'harvested' by mowing every 2 weeks, until cultivation in February for Treatment 4 and till spear production stopped in April for Treatment 5. The herbicide treatments were applied with a precision sprayer at 230 kPa delivering 300 litres/ha. They were applied over *Proc. 45th N.Z. Plant Protection Conf. 1992: 64-66*

the top of the ferns in a way similar to an application from a high-rise tractor. Pulse was added to glyphosate (2.16 kg/ha) at 0.2% and to metsulfuron (102 g/ha) at 0.1%, while glufosinate-ammonium (1.5 kg/ha) had Citowett added at 0.025%.

Asparagus ferns were counted at the end of the growing season (26.6.90) except treatments 7 to 10 which still had full fern coverage. During the harvest season following the application of treatments (September to December 1990), four counts of spears/ferns were made as a measure of the viability of the remaining crowns. The spears were removed at each count. Treatment 10 was re-evaluated on a new bed in the subsequent season (1991) to confirm the results.

Counts of spears/ferns (Table 2) showed that the fumigation was effective in killing all the asparagus crowns. The fumigated plots remained weed free for most of the remainder of the year but decomposition of the asparagus debris was slow. Initial rotary hoeing at closeup (Treatments 2 and 3) was not completely effective by itself because new ferns appeared in these plots during the summer. The follow up by either more cultivation (Treatment 2) or spraying the new ferns with glyphosate (Treatment 3) killed most of these remaining ferns and crowns. Closing up for 2 months (Treatment 6) or extending the harvest season to February (Treatment 4) before a single three-pass cultivation was not as effective as repeat cultivation. The extended harvesting resulted in slightly better control, probably due to the continued removal of plant food reserves, but these differences were not significant. Extended harvesting over the whole growing season (Treatment 5) was not sufficient to exhaust the crowns' reserves and kill the plants. Cultivation in winter (Treatment 10) using three successively deeper passes also gave excellent control. Repetition of this treatment in the subsequent season again proved very effective.

TABLE 2: Numbers of spears/ferns per 100 m².

Treatment	Ferns	Spears/ferns				Total
		26.6.90	5.10.90	25.10.90	19.11.90	
1	0	0	0	0	0	0
2	0	0.4	4	10	4	18
3	0.8	0	2	7	1.3	11
4	43	1.3	38	104	58	201
5	3.3	168	485	719	581	1953
6	70	11	49	182	136	378
7	-*	55	153	479	553	1240
8	-	280	430	1084	1413	3207
9	-*	165	565	886	906	2522
10	-	20	15	32	20	87
SED† (5%)	33	56	108	219	276	592

- Ferns allowed to develop fully before treatment application.

* Ferns damaged by herbicide treatments.

† Treatment 1 excluded from analyses.

Both glyphosate and glufosinate-ammonium caused some fern damage (with glyphosate being significantly more effective) and reduced spear production in the following season more than metsulfuron, which was the least effective of the three herbicides.

The above results suggest that good control of unwanted asparagus plants is possible at a reasonable cost by rotary hoeing. It appears necessary to cultivate to a depth that will undercut the crown and sever all the roots. Observations have shown that disc ploughing also gave satisfactory results when all roots were severed. Chopping the crown into fragments may not be necessary as mature crowns do not appear to re-establish readily. Control in the summer/autumn will probably benefit from a follow

up treatment of further cultivation or spraying to destroy the surviving crowns and new ferns. Foliar application of herbicides was ineffective and use of a fumigant, although very effective, would be very costly. The best options appear to be cultivation in the summer, with repeat cultivation or spraying of surviving plants, or cultivation in the winter after the ferns have died. The undecomposed plant residue, especially crowns and roots, may pose a problem in seed bed preparation in some cases.