



# Horticultural Development Council

## Working for Growers

### Research Report

FV30d  
Perennial weed control on  
asparagus  
  
Final report

## FV 30d Perennial weed control on Asparagus

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Project Leader: J R A Steckel

Location: HRI, Wellesbourne

Start date: March 1991

### Introduction

The asparagus crop in the UK is worth approximately three million pounds per annum and the acreage is comprised of a relatively large number of small growers. Maintenance of the productivity of beds is a major concern to growers and perennial weeds pose a particular threat. Off-label approval for some chemicals for spot treatment of perennial weeds in asparagus beds have been applied for but there is now a need to extend the range of herbicides available to growers and to develop new methods of application involving application after the crop has been 'clear cut' and before the spears/bower regrows.

### Objectives

To apply for off-label approval on the following herbicides: Round-up, Shield, Weedazol, 2,4-D amine and to provide asparagus spears for residue analysis.

### Description of work

On an established asparagus crop at Luddington which had previously been used for herbicide evaluation in 1990 (see enclosed report) the four herbicides were applied in June 1991 after harvesting had been completed and all visible spears and bower removed (Table 1).

In 1992 two samples of spears from three replications of treated and untreated control plots were cut on 12 and 29 May. One kilogram of trimmed spears per plot were washed, frozen and stored for evaluation.

Off-label approval applications were submitted to ADAS in November.

### Conclusions

The off-label approvals are being processed and samples of spears will be sent for analysis as soon as detailed requirements are known.

Table 1 Herbicides sprayed on 19 June 1991

<u>Product</u>	<u>Chemical</u>	<u>Rate*</u>
Roundup	Glyphosate	5 l product/ha
Weedazol	Aminotriazole	20l product/ha
Shield	Clopyralid	1 l product/ha
2 4-D amine	2 4-D	4 l product/ha (2kg active ingredient/ha)

\*Sprays applied by knapsack sprayer and boom in 400 l/ha water

REPORT FOR HORTICULTURAL DEVELOPMENT COUNCIL  
 ASPARAGUS HERBICIDES

ASPARAGUS - HERBICIDES FOR MODULE TRANSPLANTS AND CONTROL OF PERENNIAL WEEDS  
 IN ESTABLISHED PLANTATIONS

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**Introduction**

The objectives of this project are i) to evaluate herbicides for use on newly planted asparagus seedlings raised in cell trays, and, ii) to evaluate herbicides for the control of perennial weeds in established plantations.

At present (1989) there are no herbicides approved for use on newly planted asparagus seedlings. This project should allow 'off label' clearance to be obtained for chemicals that have proved effective in weed control and have no, or only minimal, phytotoxic effects on the young asparagus plants.

The second part of the project funded by 1990 by HDC is evaluating chemicals for the control of perennial weeds in established crops, to help to prevent the early failure of plantations due to ineffective weed control. This has the objective of eventually obtaining 'off label' clearances for chemicals that prove suitable.

**Methods**

The plantations of asparagus, cv. Franklim, were established in the early part of 1988 at Luddington EHS. One was planted into clean ground, the other in an area known to contain several problem perennial weed species.

All plants were raised from seed in Hassy 104 modules, sown on 3 March and planted in the field on 23 May. Both plantations established well and experimental treatments were applied in 1989 to the perennial weed control trial.

HERBICIDES FOR MODULE RAISED TRANSPLANTS

Treatments

Twelve treatments were applied to the module raised plants in 1988. These are listed below with the quantity of product applied.

A. diuron (Karmex 80%) at 1.5 kg/ha	3 weeks post planting
B. simazine at 1.5 kg/ha, 50% product	3 weeks post planting
C. simazine (split dose) at 0.75 kg/ha, 50% product	3 & 9 weeks post planting
D. linuron (split dose) at 0.75 kg/ha, 50% product	3, 6 & 9 weeks post planting
E. diuron (Karmex 80%)+metribuzin (Sencorex) at 1.5+1.0 kg/ha	3 weeks post planting
G. methabenzthiazuron (Tribunil)+metribuzin (Sencorex) at 2.8+1.0 kg/ha	3 weeks post planting
H. linuron at 2.2 kg/ha 50% product	3 weeks post planting
J. metamitron (Goltix) at 2.8 kg/ha	3 & 6 weeks post planting
K. aziprotryne (Brasoran) at 3.4 kg/ha	3 weeks post planting
L. metazachlor (Butisan S) at 3.0 l/ha	3 weeks post planting
M. Control, handweeded regularly	
N. Control, no weeding for first 2½ months of growth	

The spray programme commenced on 14 June and the final sprays were applied to treatments C and D on 27 July.

The plots were split in 1989. Half received the same treatments as 1988 starting 3 weeks after spear emergence. The other half remain untreated. The first yields were taken in 1990.

### Results

In 1988 stand counts, vigour and percentage weed cover assessments were made after the final spray application.

#### a) Percentage stand counts

Survival of plants was extremely good, with at least 98 per cent establishment. None of the treatments actually killed any of the seedlings, but there was some effect on vigour.

#### b) Vigour scores

The vigour scores were based on a visual estimate. A 1-5 scale was used with 5 being considered unaffected and 1 being virtually dead. Figures obtained are shown in the table.

#### c) Percentage weed cover

The figures for % weed cover, again based on visual estimates, are shown in the table. Some considerable differences were noted.

Treatment	Vigour score Means 3 reps	% weed cover Means 3 reps
A	3.3	10
B	3.3	40
C	3.5	53
D	3.3	3
E	2.9	0
G	2.9	0
H	2.9	0
J	3.8	10
K	3.9	10
L	3.6	40
M	3.9	0
N	3.4	60

These first year scores are insufficient to allow for any definite conclusions to be drawn. However, some trends are visible. Stand counts were not affected by any of the treatments but there were variations in the vigour scores.

Other than the handweeded control (M) the treatments with the best weed control gave the lowest vigour (E,G,H) score. Brasoran and Goltix (treatments J, K) look very promising with high vigour score and effective weed control. Butisan S (treatment L) and the two simazine (B, C) treatments gave almost no weed control. The 1989 treatments and 1990 yields will give a better appreciation of the efficacy or otherwise of the treatments.

It must be stressed that none of the treatments applied have approval for use on 3 week old asparagus seedlings, although diuron and simazine are cleared fully for use on established asparagus and aziprotryne is cleared through a current interim arrangement. In 1990, the first cut for yield was made starting 20 April and ending 16 May. Yields of spears in size grades, in class I, II unmarketable and total are shown in Table 1. There were no significant differences between treatments for total yield, or yield of class I. Similarly, there were no effects on the numbers of spears cut (Tables 2, 3) or percentage of spears in classes (Tables 4 and 5). There were too few weeds on the trial and scores of weed cover were not made.

ASPARAGUS LUDDINGTON (1990 HARVEST) HERBICIDE TRIAL I

TABLE I : Yields kg/ha in size grades (mm) 1990

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I	<8 mm	8-10 mm	Blown & Twisted	Total Class II	Grand Total
Diuron	869	350	86	1305	16	159	2629	2804	4109
Simazine@1.5kg/ha	954	414	51	1419	20	189	2310	2520	3939
Simazine@0.75kg/ha	912	423	45	1379	14	157	2444	2615	3994
Linuron@0.75kg/ha	943	391	57	1390	23	175	2265	2462	3852
Diuron+Sencorex	811	495	27	1334	7	110	2936	3054	4388
Tribunil+Sencorex	851	431	66	1348	10	114	3008	3132	4480
Linuron@2.2kg/ha	839	328	27	1193	16	199	2566	2781	3974
Goltix@2.8kg/ha	1111	381	73	1565	25	243	2645	2914	4480
Brasdran@3.4kg/ha	1016	392	73	1481	20	206	2692	2917	4398
Butisan@3.0kg/ha	1037	439	133	1609	19	189	2257	2465	4074
Hand-weeded	813	350	34	1198	25	173	2398	2596	3794
Control(no weeding)	891	356	89	1336	29	238	2266	2533	3869
Means	921	396	63	1380	19	179	2535	2733	4112
LSD 5% from means	335	212	99	458	21	97	539	479	563

TABLE 2 : No. spears (thousands/ha) CLASS I and grand total

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I	Grand Total
Diuron	33.0	8.9	1.3	43.2	179.8
Simaz 1.5	35.6	10.4	1.0	47.0	169.2
Simaz 0.75	34.3	11.4	1.0	46.7	173.2
Lin 0.75	36.6	10.8	1.2	48.5	172.7
Diur+Sencor	30.0	12.6	0.5	43.1	177.8
Trib+Sencor	30.1	11.1	1.2	42.4	172.4
Lin 2.2	31.8	8.3	0.5	40.6	172.7
Goltix	42.1	10.1	2.6	54.8	197.2
Brasdran	38.6	11.3	2.5	52.3	192.3
Butisan	58.6	10.9	5.6	75.2	198.9
Hand	29.6	8.4	0.7	38.7	159.8
Control	33.8	8.9	1.8	44.5	171.6
Means	36.2	10.27	1.7	48.1	178.1
LSD 5% from means	18.7	5.9	4.4	18.8	31.3

TABLE 3 : No. spears (thousands/ha) CLASS II and total CLASS II

HERBICIDE	<8 mm	8-10 mm	Blown mm	Total Class II
Diuron	2.0	10.6	124.0	136.6
Simaz 1.5	2.2	12.6	107.5	122.2
Simaz 0.75	1.7	10.4	114.4	126.5
Lin 0.75	2.3	11.3	110.6	124.2
Diur+Sencor	0.8	7.1	126.8	134.8
Trib+Sencor	1.2	7.6	121.2	130.0
Lin 2.2	2.0	11.6	118.6	132.1
Goltix	3.0	16.1	123.4	142.4
Brasdran	2.3	13.4	124.2	139.9
Butisan	2.3	12.4	109.0	123.7
Hand	2.6	11.3	107.1	121.0
Control	3.5	15.2	108.3	127.0
Means	2.1	11.6	116.3	130.0
LSD 5% from means	2.6	6.8	21.3	19.9

TABLE 4 : Percent spears (by number) CLASS I and grand total  
Figures angularly transformed actual % in brackets

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I
Diuron	(18.2) 25.2	(5.0) 12.7	(0.8) 4.7	(24.0) 29.2
Simaz 1.5	(20.8) 27.1	(6.2) 14.4	(0.6) 4.2	(27.6) 31.7
Simaz 0.75	(19.9) 26.4	(6.6) 14.4	(0.6) 4.2	(27.0) 31.3
Lin 0.75	(21.0) 27.3	(6.1) 14.0	(0.6) 3.7	(27.8) 31.8
Diur+Sencor	(16.9) 24.2	(7.1) 15.4	(0.3) 2.5	(24.3) 29.5
Trib+Sencor	(17.8) 24.9	(6.7) 14.5	(0.7) 4.6	(25.2) 30.0
Lin 2.2	(18.6) 25.4	(4.8) 12.6	(0.3) 3.1	(23.7) 29.1
Goltix	(21.2) 27.3	(5.2) 13.0	(1.2) 5.0	(27.6) 31.6
Brasdran	(19.8) 26.3	(5.9) 14.0	(1.3) 5.4	(27.1) 31.3
Butisan	(27.9) 31.7	(6.2) 13.9	(2.9) 8.2	(37.0) 37.4
Hand	(18.4) 25.3	(5.2) 13.1	(0.4) 3.7	(24.0) 29.3
Control	(19.6) 26.2	(5.3) 13.1	(1.1) 5.8	(25.9) 30.6
Means	(20.0) 26.5	(5.9) 13.8	(0.9) 4.6	(26.7) 31.1
LSD 5% from means	4.6	4.4	5.4	4.5

TABLE 5: Percent spears (by number) CLASS II and grand total  
 Figures angularly transformed actual % in brackets

HERBICIDE	<8 mm	8-10 mm	Blown mm	Total Class II
Diuron	(1.1) 5.8	(5.9) 14.0	(69.0) 56.3	(76.0) 60.8
Simaz 1.5	(1.3) 6.4	(7.3) 15.6	(63.8) 53.0	(72.4) 58.3
Simaz 0.75	(1.0) 5.5	(6.0) 14.2	(66.0) 54.4	(73.0) 58.7
Lin 0.75	(1.3) 6.4	(6.5) 14.7	(64.4) 53.4	(72.2) 58.2
Diur+Sencor	(0.4) 3.0	(4.0) 11.3	(71.3) 57.6	(75.7) 60.5
Trib+Sencor	(0.7) 4.7	(4.4) 12.1	(69.7) 56.7	(74.8) 60.0
Lin 2.2	(1.1) 5.9	(6.6) 14.8	(68.7) 56.0	(76.3) 60.9
Goltix	(1.6) 6.4	(8.1) 15.9	(62.7) 52.5	(72.4) 58.4
Brasdran	(1.2) 6.3	(6.9) 15.1	(64.8) 53.7	(72.9) 58.7
Butisan	(1.2) 6.2	(6.6) 14.7	(55.3) 48.0	(63.0) 52.6
Hand	(1.6) 6.8	(6.9) 15.0	(67.5) 55.4	(76.0) 60.7
Control	(2.0) 8.1	(8.9) 17.2	(63.2) 52.7	(74.1) 59.4
Means	(1.2) 6.0	(6.5) 14.5	(65.5) 54.3	(73.3) 58.9
LSD 5% from means	3.6	4.3	5.5	4.5

## HERBICIDES FOR PERENNIAL WEEDS

Herbicides were applied to the trial in 1989 as follows:

- A Terbacil at 1 kg/ha in April
- B Terbacil at 2 kg/ha in April
- C Fusilade at 3 l/ha in May
- D Clout at 3 kg/ha in May
- E Checkmate at 4.5 l/ha in May
- G Dalapon at 11.0 kg/ha in May
- H Terbacil (1kg/ha + Fusilade (3l/ha) )
- J Terbacil (1kg/ha) + Clout (3kg/ha) )
- K Terbacil (1kg/ha) + Checkmate (4.5l/ha)) in May
- L Terbacil (1kg/ha) + Dalapon (11kg/ha) )
- M Round up (5l/ha) ) at base of
- P Weedazol (20l/ha) ) plants mid/late June
- Q Garlon (6l/ha) )
- S MCPA (2.8 l/ha) )
- T Shield (1 l/ha) mid/late May

Yields and numbers of spears are shown in Tables 1-5.

## ASPARAGUS LUDDINGTON (1990 harvest) HERBICIDE TRIAL II

TABLE I: Yields kg/ha in size grades (mm)

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I	<8 mm	8-10 mm	Blown & Twisted	Total Class II	Grand Total
Terbacil@1kg	980	448	28	1456	20	191	2280	2490	3946
Terbacil@2kg	830	289	32	1151	50	312	2258	2620	3770
Fusilade	908	192	55	1155	26	298	1752	2076	3231
Clout	823	237	56	1116	42	222	1411	1675	2791
Checkmate	986	246	8	1241	25	218	1864	2107	3348
Dalapon	1034	346	39	1419	39	258	1800	2098	3517
Terbacil+Fusilade	943	407	34	1384	32	208	2109	2348	3732
Terbacil+Clout	1226	281	0	1507	29	220	2297	2546	4053
Terbacil+Checkmate	1159	363	31	1553	39	223	2282	2544	4098
Terbacil+Dalapon	1068	338	14	1420	61	242	2071	2373	3793
Roundup	616	91	12	720	28	241	1449	1718	2437
Weedazol	804	179	9	992	33	169	1771	1973	2964
Garlon	843	335	21	1199	42	204	1737	1983	3183
MCPA	866	231	32	1128	19	198	1611	1828	2955
Shield	868	237	70	1175	35	189	1467	1691	2866
Means	930	281	29	1241	35	226	1877	2138	3379
LSD	324	301	55	506	42	139	662	691	948



TABLE 2 : No. spears (thousands/ha) CLASS I and grand total

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I	Grand Total
Terb@1kg	37.5	12.9	0.7	51.2	183.6
Terb2kg	31.0	7.0	0.7	38.7	180.8
Fusilade	32.5	5.0	2.5	40.0	146.5
Clout	33.0	6.5	1.2	40.7	144.3
Checkm	35.5	7.0	0.2	42.7	156.0
Dalapon	47.4	20.1	0.7	68.3	194.7
Terb+Fus	35.5	10.9	0.7	47.2	170.4
Terb+Cl	45.5	7.2	0.0	52.7	209.9
Terb+Chm	46.7	8.2	0.7	55.6	187.5
Terb+Dal	40.5	18.4	0.2	59.1	193.7
Roundup	23.8	2.2	0.2	26.3	135.6
Weedazol	31.0	5.0	0.2	36.3	143.6
Garlon	31.3	9.4	0.5	41.2	148.8
MCPA	31.5	5.7	0.5	37.8	132.4
Shield	32.8	7.2	1.2	41.2	177.8
Means	35.7	8.8	0.7	45.3	167.0
LSD	13.7	14.1	1.8	21.5	47.0

TABLE 3 : No. spears (thousands/ha) CLASS II and total CLASS II

HERBICIDE	<8 mm	8-10 mm	Blown & Twisted	Total Class II
Terb@1kg	2.2	12.9	117.2	132.4
Terb2kg	5.2	21.6	115.3	142.1
Fusilade	3.0	15.9	87.7	106.6
Clout	5.2	14.9	83.5	103.6
Checkm	3.0	14.2	96.1	113.3
Dalapon	4.0	20.4	102.1	126.4
Terb+Fus	3.7	14.2	105.3	123.2
Terb+Cl	3.7	28.6	124.9	157.2
Terb+Chm	4.5	13.2	114.3	131.9
Terb+Dal	6.7	15.6	112.3	134.6
Roundup	3.2	16.6	89.4	109.3
Weedazol	4.0	11.2	92.2	107.3
Garlon	4.7	12.9	89.9	107.6
MCPA	2.2	13.2	79.2	94.6
Shield	3.5	13.4	119.7	136.6
Means	3.9	15.9	101.9	121.8
LSD	4.5	14.0	38.4	42.2

TABLE 4 : Percent spears (by number) CLASS I and grand total  
Figures angularly transformed actual % in brackets

HERBICIDE	10-16 mm	16-20 mm	>20 mm	Total Class I
Terb@1kg	(20.4) 26.8	(6.9) 14.6	(0.4) 3.1	(27.6) 31.6
Terb2kg	(17.8) 24.8	(4.0) 11.3	(0.5) 2.8	(22.3) 28.0
Fusilade	(22.1) 28.0	(3.3) 9.9	(1.5) 4.6	(26.9) 31.1
Clout	(24.2) 29.2	(5.1) 11.9	(1.0) 4.8	(30.3) 33.0
Checkm	(23.2) 28.8	(4.5) 12.0	(0.2) 1.3	(28.0) 31.9
Dalapon	(24.2) 29.5	(9.4) 16.2	(0.3) 2.3	(34.0) 35.4
Terb+Fus	(21.3) 27.4	(6.1) 13.4	(0.4) 2.5	(27.8) 31.8
Terb+Cl	(21.4) 27.5	(3.6) 10.6	(0.0) 0.0	(25.0) 29.9
Terb+Chm	(24.2) 29.3	(4.1) 10.8	(0.4) 1.8	(28.7) 32.1
Terb+Dal	(20.5) 26.8	(10.6) 16.7	(0.1) 1.0	(31.2) 33.9
Roundup	(17.7) 24.8	(1.6) 7.0	(0.2) 1.2	(19.4) 26.1
Weedazol	(21.4) 27.5	(3.2) 9.3	(0.2) 1.2	(24.7) 29.7
Garlon	(20.7) 26.8	(6.0) 13.5	(0.3) 2.3	(27.0) 31.1
MCPA	(23.3) 28.8	(4.4) 11.9	(0.3) 2.3	(28.1) 31.9
Shield	(20.5) 26.5	(3.8) 11.0	(0.8) 4.3	(25.0) 29.8
Means	27.5	12.0	2.4	31.1
LSD	5.1	8.1	4.1	6.9

TABLE 54 : Percent spears (by number) CLASS II and grand total  
Figures angularly transformed actual % in brackets

HERBICIDE	<8 mm	8-10 mm	Blown & Twisted	Total Class II
Terb@1kg	(1.2) 5.2	(7.0) 15.3	(64.2) 53.3	(72.4) 58.4
Terb2kg	(2.8) 9.6	(11.6) 19.6	(63.3) 52.7	(77.7) 62.0
Fusilade	(2.1) 8.0	(11.1) 19.2	(59.9) 50.7	(73.1) 58.9
Clout	(3.7) 10.5	(10.3) 18.7	(55.8) 48.4	(69.7) 57.0
Checkm	(1.8) 7.6	(9.2) 17.5	(61.0) 51.4	(72.0) 58.1
Dalapon	(2.2) 8.0	(10.4) 18.7	(53.5) 47.0	(66.0) 54.6
Terb+Fus	(2.3) 7.9	(8.2) 16.5	(61.7) 51.8	(72.2) 58.2
Terb+Cl	(1.9) 7.4	(11.8) 19.2	(61.4) 51.7	(75.0) 60.1
Terb+Chm	(2.6) 8.9	(7.6) 15.5	(61.1) 51.5	(71.3) 57.9
Terb+Dal	(3.2) 9.4	(7.6) 15.5	(58.0) 49.6	(68.8) 56.1
Roundup	(2.6) 9.0	(12.7) 20.8	(65.3) 53.9	(80.6) 63.9
Weedazol	(2.7) 9.1	(7.7) 16.0	(64.9) 53.8	(75.3) 60.3
Garlon	(3.2) 9.2	(8.6) 16.9	(61.2) 51.6	(73.0) 58.9
MCPA	(1.9) 6.6	(10.2) 18.1	(59.8) 50.7	(71.9) 58.1
Shield	(2.1) 7.1	(8.6) 16.5	(64.2) 53.5	(75.0) 60.2
Means	8.2	17.6	51.5	58.8
LSD	5.4	5.7	7.2	6.9

In this trial there were no controls and so the yields are compared with the control plots in the annual weed trial.

Of the treatments applied only Roundup and Weedazol reduced yields below the control plots but the statistical significance of this is not simple to assess. There were small differences between each of the remaining herbicide treatments and some evidence that Terbacil treatment at the low rate and in combination with Clout, Checkmate and Dalapon had the least adverse effects on yields. However, weed control in these treatments appeared to be poorer than some of the other treatments as measured by ground cover (see Table 6). Table 6 also gives estimates of the weeds present on each plot. These figures should be treated with caution as absence does not mean that the chemical controlled the weed - it may not have been present at the start of the experiment.

