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# 1974 The ecology and control of doublegee (*Emex australis*) and *Emex spinosa*

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## Recommended Citation

Gilbey, D.J. (1974), *1974 The ecology and control of doublegee (Emex australis) and Emex spinosa*. Department of Agriculture and Food, Western Australia, Perth. Report.

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SUMMARY OF EXPERIMENTAL RESULTS

FIELD TRIALS 1974.

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WESTERN AUSTRALIAN  
DEPARTMENT OF AGRICULTURE

The ecology and Control of  
Doublegee (*Emex Australis*)  
and *Emex spinosa*.

## DOUBLEGEE ECOLOGY AND CONTROL

### Introduction

The objectives of the field experimental programme for 1974 were to -

- 1) Evaluate a technique to measure pasture loss as a result of doublegee infestation at Merredin, Wongan Hills and Chapman.
- 2) Evaluate the effect of cultural and herbicide treatment combinations on the magnitude and distribution of viable doublegee seeds in the soil at Avondale, Merredin, Wongan Hills and Chapman.
- 3) Measure the magnitude and distribution of viable doublegee seeds in the soil from paddocks representing each year of a two crop, plus three year pasture ley rotation at Avondale, Merredin, Wongan Hills and Chapman.
- 4) Screen herbicides for selective control of doublegee in legume pasture at Avondale, Merredin, Wongan Hills, Mullewa, and Chapman.
- 5) Evaluate the tolerance of Tournefield medic to Tribunil at Geraldton.
- 6) Compare several herbicides with a cultural treatment on doublegees that emerge after late summer rains in an expected "false break" situation at Wongan Hills.
- 7) A co-operative project with CSIRO was commenced on the biological control of doublegee with the introduction of the weevil *Apion antiquum* at two wheat-belt sites.

Summary of Results - for the benefit of officers not interested in site details and data.

- 1) Pasture loss evaluation - This work showed that a technique used successfully in crop loss measurement due to doublegee infestation could not be used in pasture loss assessment, because a single measurement of pasture loss did not account for the differing growth rates and physiology of the several pasture species encountered. The project has shown the maximum doublegee numbers encountered at each site that occurred. This forms a basis for further ecological studies.
- 2) The survey of doublegee seed distribution on selected paddocks representing each year of a clover ley rotation has shown that, highest viable doublegee seed numbers in the top 50 mm of soil have occurred in paddocks that have grown 1 year of

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pasture following a cereal crop. Very few viable doublegee seeds were recovered from burrs that had been buried and undisturbed for two years or more under pasture.

- 3) Tribunil at 560 g/h is the only commercially available herbicide that gave selective doublegee control in legume pasture, but the results were variable and this treatment is not considered entirely satisfactory.
- 4) Tournefield was tolerant to three times the rate of Tribunil suggested for selective doublegee control in pasture.
- 5) Neither herbicides nor ploughing and reseeded legume pasture gave satisfactory control of doublegees that emerged following a late summer rain. The doublegee numbers observed in crop surrounding the trial area were low, and this suggests that planting a second successive cereal crop is a more satisfactory way of coping with thick doublegees, that occurs after late summer rains, than attempting to re-establish a legume pasture.
- 6) Weevils for the biological control of doublegee were only introduced in August '74 and no substantial damage to doublegee was apparent by the end of the growing season. But insects were recovered from both sites 12 weeks after introduction, showing that they had completed at least one life cycle.

TRIAL SITE DETAILS AND DATA

74M12

Title - Doublegee - Pasture loss  
Locality - Merredin Research Station  
Soil - Red sandy clay  
Vegetation - Salmon Gum  
History - Cropped 1973, regenerated Cyprus Barrel medic 1974.

Results

Plot No.	Plants m <sup>-2</sup>		Proportion of ground cover	
	13/5/74	30/5/74	30/5/74	24/6/74
1	38	42	61	15
2	48	56	58	19
3	21	21	52	28
4	26	30	35	22
5	24	24	8	8
6	21	21	30	3
7	41	71	66	22
8	32	36	24	6

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Plot No.	Plants m <sup>-2</sup>		Proportion of ground cover	
	13/5/74	30/5/74	30/5/74	24/6/74
9	15	19	31	5
10	9	16	20	4
11	49	53	46	35
12	17	18	20	16
13	17	14	12	7
14	5	6	7	3
15	4	2	0	2
16	26	33	29	13
17	25	19	18	8
18	5	3	5	0
19	48	41	49	19
20	27	38	43	13
21	6	9	8	2
22	27	56	75	26
23	44	62	46	18
24	37	60	45	27
25	59	59	36	7
26	86	75	80	30
27	37	58	63	18
28	38	22	15	4
29	71	78	94	26
30	87	100	108	28
31	64	52	83	23
32	106	102	95	24
33	112	81	69	10
34	94	73	72	24
35	150	142	92	37
36	69	63	72	19
37	87	104	91	21
38	51	76	83	13
39	102	89	74	5
40	77	84	74	11

Comment - Pasture collapsed during sudden dry spell and began rotting after further rain at the end of the season. Not harvested. Plant measurements show that medic pasture had increased ground cover between 30/5/74 and 24/6/74. Doublegee had reduced ground cover in this time. Maximum doublegee plants m<sup>-2</sup> = 150.

74 WH16

Title - Doublegee - Pasture loss  
Locality - Wongan Hills Research Station  
Soil - Gravelly sand  
History - Cropped 1972, resown to sub clover 1973,  
topdressed 1974.

Results and Comments - Doublegee plant numbers per sq. m. were recorded from 40 x 1 sq. metre plots on 1/5, 17/5, 13/6 and the doublegee plants and pasture was harvested on 24-26th September. No significant decline in doublegee plants  $m^{-2}$  occurred between 1/5/74 and 13/6/74. Maximum number recorded on 1/5 was 410 plants  $m^{-2}$ . The mean % pasture loss was 2.3% (S.E. mean 1%) and % pasture loss had no significant relationship to doublegee plant numbers.

74 C17

Title - Doublegee - Pasture loss  
Locality - Chapman Research Station  
Soil - Red loamy sand  
History - Cropped 1973, resown to sub clover 1974.

Results and Comments - Doublegee plant numbers  $m^{-2}$  were recorded on 8/5, 22/5/ 5/6 and botanical composition for doublegee and clover was recorded on 19/6 and 3/7. Doublegee, clover and other pasture species (mainly capeweed) were harvested 16-18th September. Maximum doublegee numbers were recorded on 8/5 at 188 plants  $m^{-2}$ . The % pasture loss had no relationship to any plant measurements made early in the growing season.

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Title - Doublegee - buried seed survey  
 Locality - Merredin Research Station  
 History - 1st Year pasture - cropped 1972, pasture resown 1973.  
           2nd Year pasture - last cropped 1971.  
           1st Year crop - pasture 1969-72 cropped 1973.  
           2nd Year crop - cropped 1972-73.

Method - Thirty soil samples were taken in March 1974 from dense doublegee areas in each paddock. Burrs were removed from the soil, counted and inspected for viability.

Results

	1st Year Pasture	2nd Year Pasture	1st Year Crop	2nd Year Crop
Burrs m <sup>-2</sup> ( $\pm$ 95% cl)	3092 $\pm$ 969	2463 $\pm$ 382	2044 $\pm$ 577	2208 $\pm$ 382
Estimated viable seed m <sup>-2</sup>				
Surface	707	233	151	41
0-25 mm	391	180	437	131
25-50 mm	63	46	102	90
50-75 mm	12	0	21	0
75-100 mm	0	0	0	0
100+ mm	0	0	0	0
Total viable seed m <sup>-2</sup>	1173	459	711	262



Title - Doublegee - buried seed survey  
 Locality - Avondale Research Station  
 Soil - Red sandy loam  
 Vegetation - York gum  
 History - 1st Year pasture paddock - cropped 1970-72, pasture  
 resown 1973.  
 2nd Year pasture paddock - cropped 1971 pasture  
 resown 1972.  
 3rd Year pasture paddock - cropped 1969-70, pasture  
 resown 1971.  
 1st Year crop paddock - crop 1971, pasture 1972,  
 crop 1973, (sprayed).

Method - Thirty soil samples were taken in March 1974 from dense  
 doublegee areas in each paddock. Burrs were removed from the  
 soil counted and inspected for viability.

Results

	1st Year Pasture	2nd Year Pasture	3rd Year Pasture	1st Year Crop
Burrs m <sup>-2</sup> ( $\pm 95\%cl$ )	3975 $\pm$ 1217	6453 $\pm$ 693	8179 $\pm$ 1952	1388 $\pm$ 307
Estimated viable seed m <sup>-2</sup>				
Surface	1844	1795	3389	14
0-25 mm	434	1879	1562	37
25-50 mm	15	175	43	21
50-75 mm	16	163	13	8
75-100mm	17	0	0	15
100 + mm	0	0	0	0
Total viable seed m <sup>-2</sup>	2326	4012	5007	95

Title - Doublegee - buried seed survey  
 Locality - Wongan Hills Research Station  
 History - 1st Year pasture - cropped 1972, pasture resown 1973.  
 2nd year pasture - cropped 1971 pasture resown 1972.  
 3rd Year pasture - cropped 1970, pasture resown 1971.  
 1st Year crop - pasture 1971-72 crop 1973.

Method - Thirty soil samples were taken in March 1974 from dense doublegee areas in each paddock. Burrs were removed from the soil, counted and inspected for viability.

Results

	1st Year Pasture	2nd Year Pasture	3rd Year Pasture	1st Year Crop
Burrs m <sup>-2</sup> ( $\pm 95\%cl$ )	8705 $\pm$ 1042	2484 $\pm$ 656	5921 $\pm$ 1511	7471 $\pm$ 1327
Estimated viable seed m <sup>-2</sup>				
Surface	393	417	147	257
0-25 mm	611	142	179	143
25-50 mm	45	6	0	20
50-75 mm	16	0	0	13
75-100 mm	16	0	0	7
100+ mm	0	0	0	0
Total viable seed m <sup>-2</sup>	1081	565	326	440

Title - Doublegee - buried seed survey  
 Locality - Chapman Research Station  
 History - 1st Year pasture - crop 1971-72 pasture resown 1973.  
 2nd Year pasture - crop 1971 pasture resown 1972.  
 3rd Year pasture - crop 1970 pasture resown 1971.  
 1st Year crop - pasture 1969-72 crop 1973.

Method - Thirty soil samples were taken in March 1974 from dense doublegee areas in each paddock. Burrs were removed from the soil, counted and inspected for viability.

Results

	1st Year Pasture	2nd Year Pasture	3rd Year Pasture	1st Year Crop
Burrs m <sup>-2</sup> (+95%cl)	6782 ± 781	5883 ± 1673	2050 ± 482	1401 ± 478
Estimated viable seed m <sup>-2</sup>				
Surface	846	1719	304	0
0-25 mm	321	476	156	116
25-50 mm	37	0	4	81
50-75 mm	98	0	6	60
75-100 mm	98	0	0	0
100+ mm	0	0	0	0
Total viable seed m <sup>-2</sup>	1400	2195	470	257

Title - Doublegee - Herbicides in Pasture  
 Locality - Avondale Research Station  
 Pasture Species - Daliak sub clover with some Geraldton and  
 Dwalganup.

Sprayed on 17/5/74 when doublegee had grown 6-8 leaves.

Results

Treatment	% Control of Doublegee	Mean Clover rating
Nil	Nil	6.0
Tribunil 300 g/ha	65%	6.0
" 600 g/ha	94%	6.0
" 900 g/ha	96%	5.7
" 1800 g/ha	99%	4.0
Igron 600 "	93%	4.7
900 "	94%	2.7
1800 "	99%	0.7
Tribunil 300 + 24D * 280 ml/ha	57%	5.7
600 + 24D * 280 ml/ha	88%	4.7
Igron 600 + 24D * 280 ml/ha	88%	3.3
* 50% 24D Amine	LSD 0.05 = 23%	0 = 100% Kill 6 = No effect of spray

Title - Doublegee - Herbicides in Pasture  
Locality - Merredin Research Station  
Pasture Species - Cyprus Barrel Medic.

Sprayed on 30/4/74 when largest doublegee plants had grown  
2-3 leaves. Plant counts were made on 14.6.74.

Results

Treatment	Mean Doublegee plants m <sup>-2</sup>	Mean medic plants m <sup>-2</sup>
Nil	6.00	911
Tribunil 300 g/ha	4.30	815
" 600 g/ha	3.7	945
" 900 g/ha	4.9	994
" 1800 g/ha	1.2	513
Igron 600 g/ha	1.6	992
" 900 g/ha	1.9	869
" 1800 g/ha	1.7	456
Tribunil 300 + 24D 280 ml/ha	1.9	243
" 600 + " "	0.2	250
Igron 600 + " "	1.1	270

Comment - Doublegees where still emerging at the time of  
spraying.

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Title - Doublegee - Herbicide in Pasture.  
 Locality - Wongan Hills Research Station  
 Pasture Species - Geraldton sub clover with some  
 Dwalganup.

Sprayed on 1.5.74 when largest doublegee plants had grown  
 2 - 3 leaves. Dry conditions at the time of spraying.

### RESULTS

<u>Treatment</u>	<u>Doublegee plants M<sup>2</sup> on 20.6.74</u>
Nil	39
Tribunil 300 g/ha	50
Tribunil 600 g/ha	32
Tribunil 900 g/ha	28
Tribunil 1800 g/ha	15
Igron 600 g/ha	40
Igron 900 g/ha	27
Igron 1800 g/ha	30
Tribunil 300 g/ha + 24D 280ml/ha	19
Tribunil 600 g/ha + 24D 280ml/ha	17
Igron 600 g/ha + 24D 280ml/ha	18

### COMMENT

Doublegees continued to emerge after spraying. No  
 treatments caused damage to pasture on visual assessment.

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Title - Doublegee Herbicides in Pasture  
Locality - Chapman Research Station  
Pasture Species - Geraldton sub clover

Sprayed on 9.5.74 when largest doublegees had grown 2 - 3 leaves.

RESULTS

Visual ratings showed that no treatments gave satisfactory selective doublegee control. A possible reason for the poor result is that doublegees continued to emerge after spraying because of the ill defined beginning to the growing season. Later emerged plants thus avoided the treatments.

Title - Tolerance of Tournefield medic to  
Tribunil.

Locality - F. Strickland, Geraldton

Sprayed tournefield medic at the 2 - 3 trifoliolate leaf stage with Tribunil at 8, 12 and 24 oz/ac.

RESULTS

Visual assessment on 2.10.74 showed that the highest rate of herbicide had not reduced the growth of the medic compared to unsprayed plots. Plant counts in August 1974 showed that 8 and 12 oz Tribunil/ac had reduced capeweed, radish and turnip in the pasture, and that some plants survived the 24 oz Tribunil/ac treatment.

Title - Doublegee Control - False Break

Locality - Wongan Hills Research Station

History - Paddock previously infested with heavy stand of doublegee, cropped 1973, a heavy stand of doublegees emerged in late March 1974 as a result of late summer rains. Little or no clover had emerged at the first time of spraying on 2/5/74. One treatment had been ploughed and was sown to sub clover on 10/5/74. Another treatment was sprayed with Tribunil on 20/5/74 when no further emergence of doublegee was expected, and many plants had grown 5-6 leaves. Plots were rated visually on 12/6/74.

Results

Treatment	Visual Rating on Doublegee	Comments
Spray seed 750 ml/h	3.7	
" 1500 ml/h	4.3	
Tribunil 500 gm/h	1.3	
Dicamba 375 ml/h	4.7	Clover severely retarded
" 750 ml/h	5.0	"
Tribunil 500 g/h (20/5/74)	2.3	
Plough and reseed clover	5.7	
Igron 750 gm/h	2.3	
Nil	0	

6 = complete kill

0 = no effect of spray

Comment - By the end of the growing season all plots were thickly infested with doublegee. No treatment was satisfactory. Good doublegee control was achieved in a surrounding barley crop which was sprayed with dicamba.