

Evaluation of new herbicides in lettuce crops

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Summary Herbicide availability in lettuce crops in Australia is currently very limited with pendimethalin and propyzamide the only available options. The data presented here is from a preliminary screening trial evaluating a number of new herbicide options in transplanted iceberg lettuce. Other trials to further evaluate these products are currently being conducted.

All herbicide treatments provided effective control of *Solanum nigrum* with dimethenamid-p and pendimethalin followed by phenmedipham providing the most effective control of this weed

Pendimethalin at 990 g a.i. ha⁻¹ tank mixed with diflufenican at 100 g a.i. ha⁻¹ applied pre transplant caused some bleaching of the crop soon after transplanting, however the bleaching was not evident at harvest. All treatments which had phenmedipham applied at 785 g a.i. ha⁻¹ at 21 days after planting showed minimal crop effects throughout the period of the trial however the average head weight in these treatments was significantly less than the hand-weeded control and other herbicide treatments.

Keywords lettuce, herbicides, weed management.

INTRODUCTION

Currently, the herbicide propyzamide is used predominantly for pre or early post-transplant weed control, while pendimethalin is also used. The use of these few herbicides has resulted in the build up of a number of weed escapes. Common escapes include groundsel (*Senecio vulgaris*) stinging nettle (*Urtica urens*), mallow (*Malva* sp.), summer grass, pigweed (*Portulaca* sp.) and potato weed (*Galinsoga parviflora*).

Growers are faced with the expensive option of inter row cultivation, which is difficult due to potential damage to root systems, or labour intensive hand weeding.

MATERIALS AND METHODS

This work was conducted as a small plot trial on a ferrosol soil at Forthside Vegetable Research Station at Forth in North West Tasmania. Plot size was 1.6 m (3 rows) by 6 m and each treatment was replicated three times. Herbicide treatments were applied with a pressurized knapsack sprayer fitted with flat fan nozzles, applying a water rate of 250 L ha⁻¹ at an application pressure of 280 kPa. Herbicides were either applied pre transplant, post transplant pre weed emergence or early post weed emergence when the weeds were at the 2 leaf

stage. The crop was iceberg lettuce (c.v. Magnum) and was transplanted on 19th November 2003. Assessments were conducted as whole plot subjective ratings using the European Weed Research System (EWRS) scales for weed control efficacy (1 = total weed control, 9 = no effect on weeds) and crop tolerance (1 = healthy plant, 9 = crop killed) (Puntener, 1981). Yield was measured at harvest by harvesting all marketable heads within the plot and counting and weighing them.

RESULTS

Crop Safety There were two herbicide treatments which showed phytotoxic effects in this trial (Table 1). Pendimethalin at 990 g a.i. ha⁻¹ tank mixed with diflufenican at 100 g a.i. ha⁻¹ applied pre transplant caused some bleaching of the crop particularly at 15DAP (days after planting). This bleaching was not evident at harvest. Pendimethalin at 990 g a.i. ha⁻¹ tank mixed with chlorthal-dimethyl at 4500 g a.i. ha⁻¹ applied pre transplant caused some minor stunting of the crop at 15DAP however the crop recovered from this stunting and had an average head weight of 520 g at harvest which was not significantly different to the hand-weeded control (Table 1). All treatments which had phenmedipham applied at 785 g a.i. ha⁻¹ at 21 DAP showed minimal crop effects throughout the period of the trial however the average head weight in these treatments was significantly less than the hand-weeded control and other herbicide treatments.

Weed Efficacy *Solanum nigrum* was the only weed of significance in this trial and it occurred at a density of approximately 25 plants per m². All herbicide treatments provided effective control of *Solanum nigrum* with dimethenamid-p and pendimethalin followed by phenmedipham providing the most effective control of this weed. At 33DAP the trial was hand-weeded to prevent weed competition affecting yield (Table 2).

DISCUSSION

This trial was conducted as part of a national project evaluating new herbicides for use in lettuce crops. Products were identified from literature reviews (White 1999, Umeda 2000) and overseas registrations. Initial screening trials identified a number of potential products which are currently being further evaluated in major lettuce production regions throughout Australia.

Table 1. EWRS crop safety ratings and crop yield data

Herbicide	Rate (g a.i. ha ⁻¹)	Application Timing***	Average EWRS Crop Rating			Average Head Weight (g) at Harvest 55DAP
			15DAP**	23DAP	33DAP	
bensulide & phenmedipham	5000 g + 785 g	1	1.3	1.0	1.3	400 b*
chloro IPC & phenmedipham	4000 g + 785 g	1	2.3	1.3	1.0	410 b
pendimethalin + diflufenican	990 g + 100 g	1	5.0	3.7	1.7	410 b
dimethenamid-p	720 g	2	1.3	1.0	1.0	520a
pendimethalin & propachlor	990 g and 2880 g	1 & 2	3.0	1.0	1.3	500a
pendimethalin & chlorthal-dimethyl	990 g + 4500 g	1 & 2	4.0	3.0	1.3	520a
pendimethalin & imazamox	990 & 32 g	1 & 3	1.0	1.0	2.0	490a
pendimethalin & phenmedipham	990 g & 785 g	1 & 3	1.0	1.0	2.7	380 b
pendimethalin & propyzamide	990 g & 2250 g	1 & 2	1.3	1.0	1.0	520a
untreated control	-	-	1.0	1.0	1.0	540a
p-value						0.000

*Means within columns followed by the same letter are not significantly different at the 5% level according to Least Significant Difference (LSD) test.

**DAP = Days After Planting.

***Application Timing 1 = Pre crop transplanting, 2 = Post transplant pre weed emergence, 3 = Post weed emergence.

Table 2. EWRS weed efficacy ratings for *Solanum nigrum* (SOLNI).

Herbicide	Rate (g a.i. ha ⁻¹)	Application Timing**	Average EWRS Rating (SOLNI)		
			15DAP*	23DAP	33DAP
bensulide & phenmedipham	5000 g + 785 g	1 & 3	3.0	7.3	4.3
chloro IPC & phenmedipham	4000 g + 785 g	1 & 3	6.0	6.3	4.7
pendimethalin + diflufenican	990 g + 100 g	1	5.7	5.7	2.7
dimethenamid-p	720 g	2	1.7	1.7	1.3
pendimethalin & propachlor	990 g and 2880 g	1 & 2	3.7	3.7	3.7
pendimethalin & chlorthal-dimethyl	990 g + 4500 g	1 & 2	5.3	4.7	4.3
pendimethalin & imazamox	990 & 32 g	1 & 3	5.7	4.3	1.0
pendimethalin & phenmedipham	990 g & 785 g	1 & 3	5.3	5.0	2.3
pendimethalin & propyzamide	990 g & 2250 g	1 & 2	4.3	3.3	2.3
untreated control	-	-	3.0	9.0	9.0

*DAP = Days After Planting.

**Application Timing 1 = Pre crop transplanting, 2 = Post transplant pre weed emergence, 3 = Post weed emergence.

ACKNOWLEDGMENTS

Funding for this project was supported by National Vegetable Research & Development Levy and Commonwealth Government through Horticulture Australia Ltd. We would also like to thank the staff at Forthside Vegetable Research Station for their assistance with this trial.

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