Horticultural Weed Control Report

2005 and 2006

Web downloads

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This edition is dedicated to the memory of Clifford Horning, who passed away unexpectedly in May of 2005. Mr. Horning was an ardent supporter of our weed management research program, and contributed land and resources to the project on many occasions. His insights and contributions are sorely missed.

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The Report

Results from vegetation management trials involving horticultural crops conducted during the past year are compiled and reported by faculty members of the Oregon Agricultural Experiment Station, the Oregon State Extension Service, and colleagues who cooperated from adjacent states along with local enterprises. This work was conducted throughout Oregon and involved many individuals.

The contributors sincerely appreciate the cooperative efforts of the many growers, university employees, and local representatives of the production and agrochemical industries. We also gratefully acknowledge financial assistance from individual growers, grower organizations, and companies that contributed to this work.

Information and Evaluation

Crops were grown at the experimental farms using accepted cultural practices (within the limits of experimentation) or trials were conducted on growers' fields. Most experiments were designed as randomized complete blocks with three to five replications. Herbicide treatments were applied uniformly with CO_2 precision plot sprayers. Unless otherwise indicated, preplant herbicide applications were incorporated with a PTO vertical tine rotary tiller operated at a depth of approximately two inches. After critical application stages, crops were irrigated with overhead sprinklers at weekly intervals or as needed.

Crop and weed responses are primarily visual evaluations of growth reduction, ranging from 0-100 percent with 100 as the maximum response for each rating. Phytotoxicity ratings are usually 1-10 with 10 being severe herbicide injury symptoms such as chlorosis or leaf deformation. Additional data such as crop yields are reported for some studies and may be reported in either English or metric systems. Use of trade names does not indicate endorsement of that product.

Abbreviations

DAP	Days after planting	**PPS**	Post-plant surface
WBP	Weeks before planting	**PPI**	Preplant incorporated
WAP	Weeks after planting	**lb/A**	Active ingredient per acre
WAT	Weeks after treatment	**no./A**	Number per acre
PRE/PES	Preemergence /preemergence surface application		

Weeds referenced in report

Annual bluegrass	*Poa annua*	Hedge bindweed	*Calystegia sepium*
Barnyardgrass	*Echinochloa crus-galli*	Pineapple weed	*Matricaria matricarioides*
Black nightshade	*Solanum nigrum*	Pigweed, Powell amaranth	*Amaranthus powellii*
Canada thistle	*Cirsium arvense*	Prickly lettuce	*Lactuca seriola*
Common lambsquarters	*Chenopodium album*	Puncturevine	*Tribulus terrestris*
Common purslane	*Portulaca oleracea*	Russian thistle	*Salsola kali*
Crabgrass	*Digitaria sanguinalis*	Shepherdspurse	*Capsella bursa-pastoris*
Dandelion	*Taraxacum spp.*	Smartweed	*Polygonum persicaria*
False dandelion	*Hypochaeris radicata*	Spiny sowthistle	*Sonchus asper*
Groundsel	*Senecio vulgaris*	Wild proso millet	*Panicum miliaceum*
Hairy nightshade	*Solanum sarrachoides*		

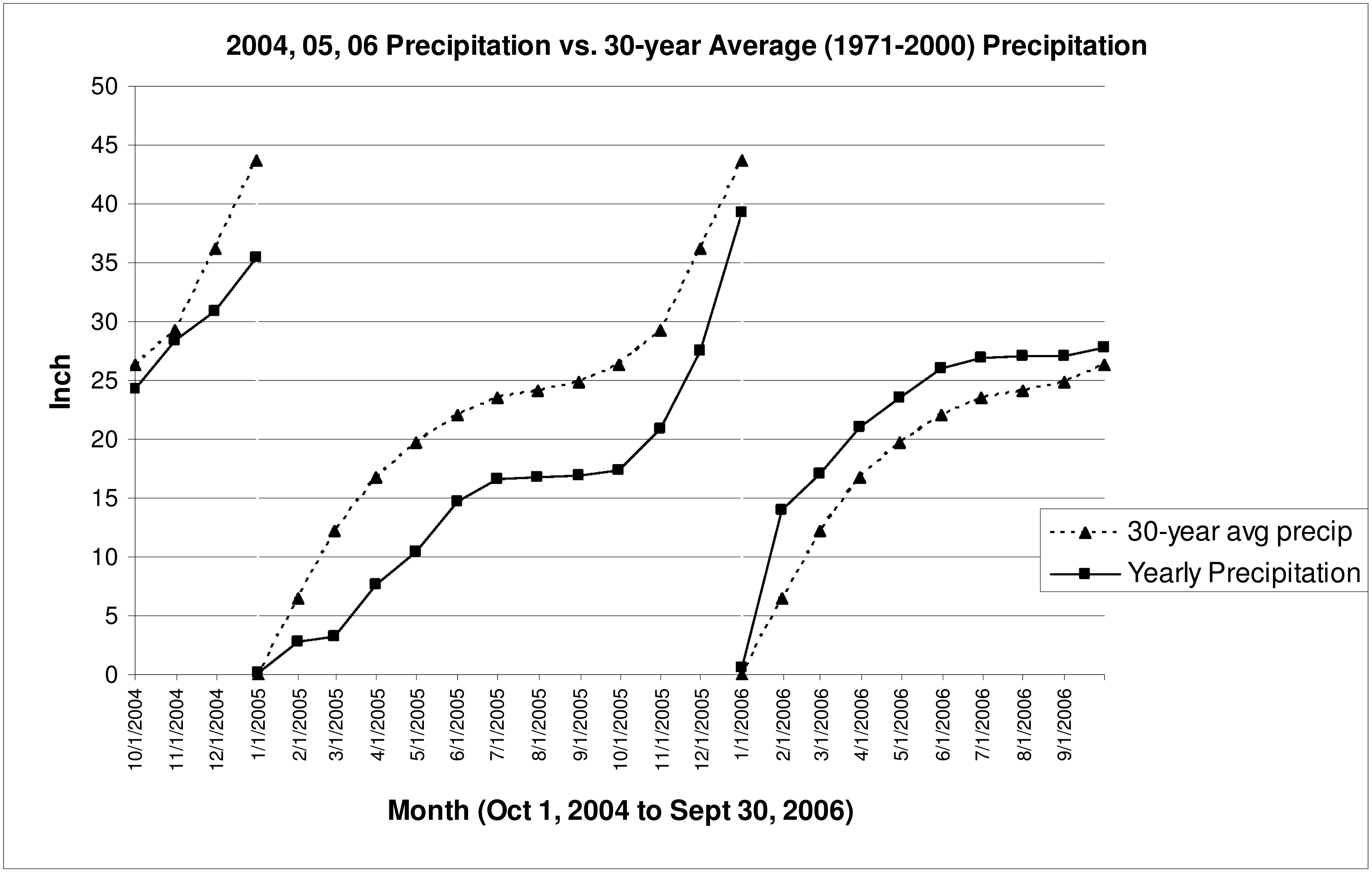

Figure 1. Precipitation (inches) recorded at Hyslop Experiment Station, Corvallis, OR between Oct 1, 2004 - Sept 30, 2006. 30-year average (1971-2001) precipitation also recorded at Hyslop Experiment Station.

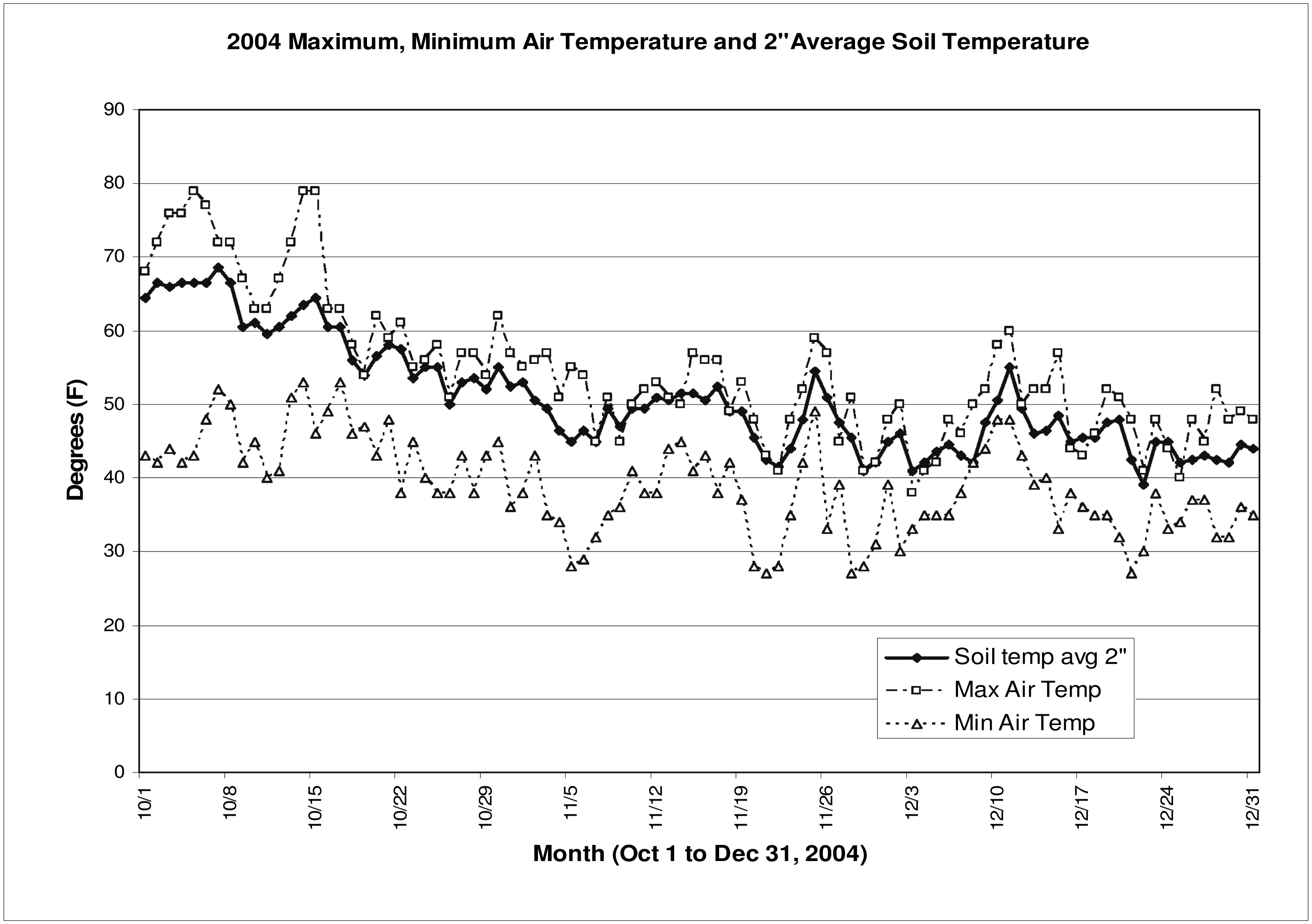

Figure 2. Maximum and minimum air temperatures and average 2” soil temperature recorded at Hyslop Experiment Station, Corvallis, OR between Oct 1, 2004- Dec 31, 2004.

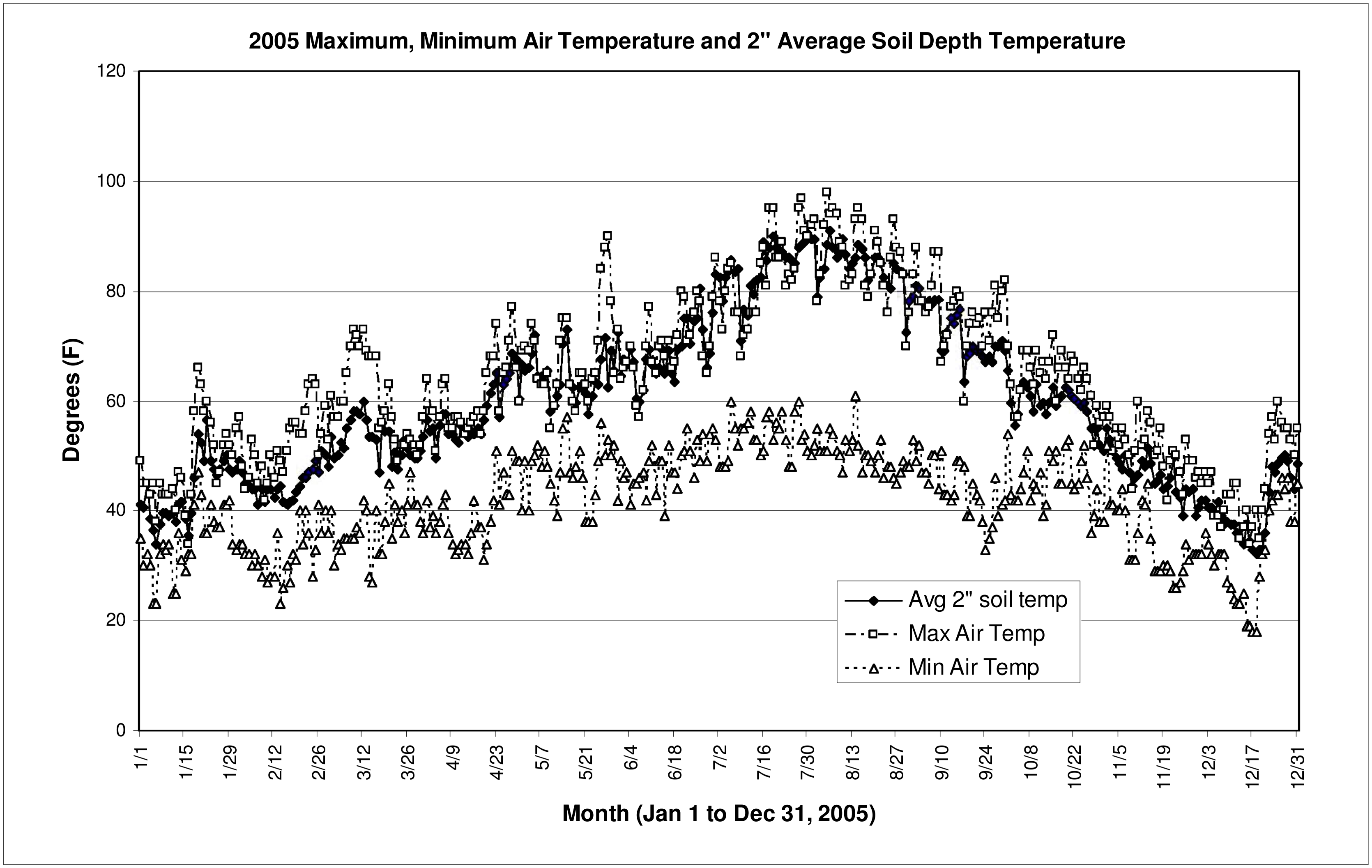

Figure 3. Maximum and minimum air temperatures and average 2" soil temperature recorded at Hyslop Experiment Station, Corvallis, OR between Jan 1, 2005- Dec 31, 2005.

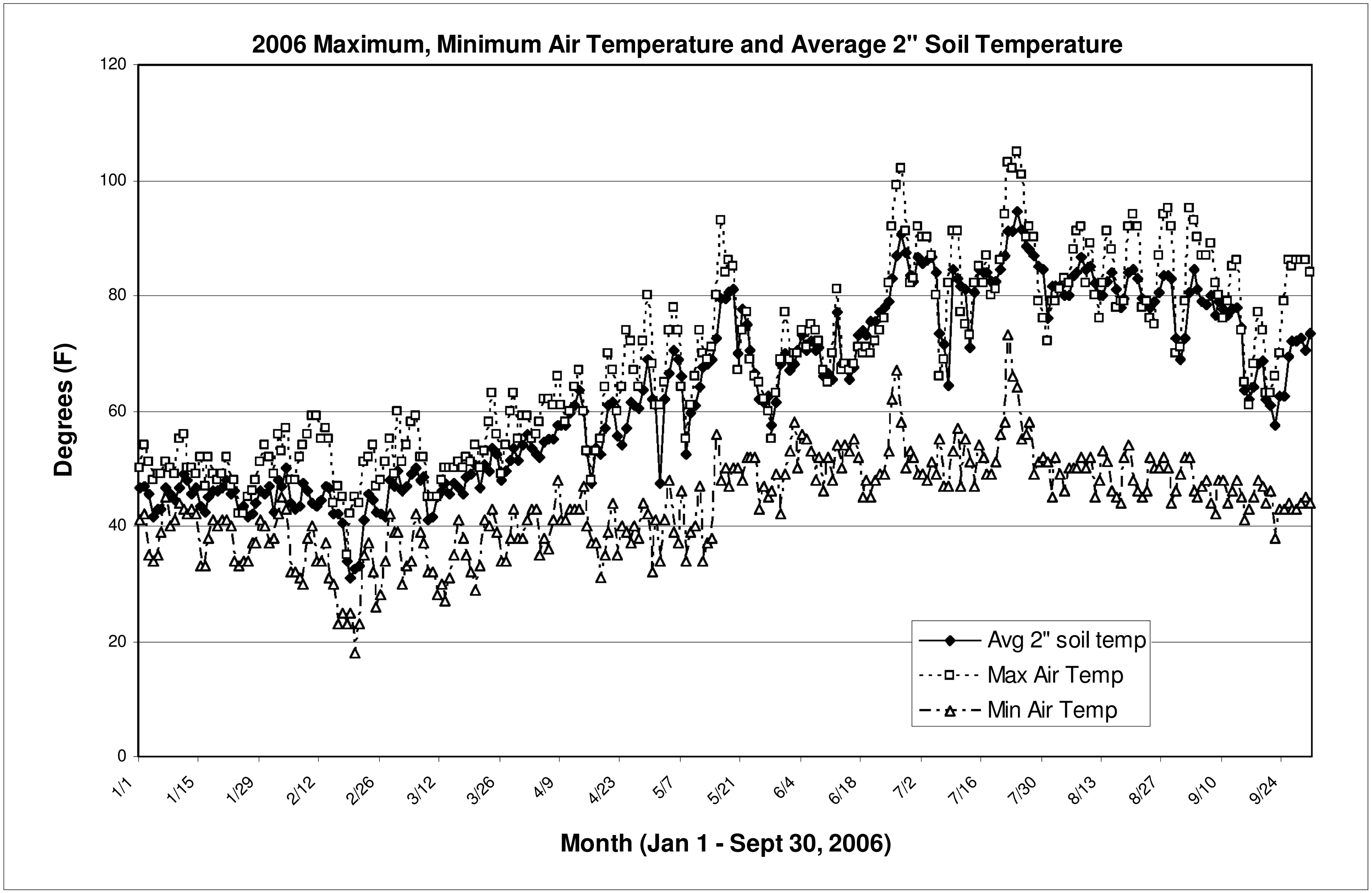

Figure 4. Maximum and minimum air temperatures and average 2" soil temperature recorded at Hyslop Experiment Station, Corvallis, OR between Jan 1, 2006- Sept 30, 2006.

WEED BIOLOGY AND CONTROL

Effect of Post-harvest Berry Placement and Glyphosate on Hairy Nightshade Seeds

Ed Peachey, Horticulture Dept, OSU

Introduction

A frequent question regards the fate of *hairy nightshade* berries following snap bean harvest. We have noted that hairy nightshade seed germinability at harvest is very dependent on berry size. However, if those berries are left on the soil surface into the fall, it appears that nearly all of the seeds become germinable, even in undeveloped berries. Another question regards the effect glyphosate has on seed development if nightshade plants are sprayed immediately after harvest. The objectives of this project were to determine the effect of post harvest weed management strategies on hairy nightshade seed development.

Methods

Glyphosate was applied to hairy nightshade plants in late August 2005. Beginning 2 weeks later, berries were collected at approximately two week intervals for 8 weeks after the treatments were applied (Table 1). Seeds were extracted from berries, dried for approximately 10 days, treated with gibberellic acid for 48 hours, rinsed in 5% bleach for 1 minute, and germinated in Petri dishes on blotter paper at 87 F.

Table 1**. Treatments applied to hairy nightshade berries.**

1.	Berries remained on plant after harvest	Glyphosate applied
2.	Berries remained on plant after harvest	No herbicide
3.	Simulated bean picker[1]	Glyphosate applied
4.	Simulated bean picker[1]	No herbicide

[1] *Berries removed from plant and placed on the soil surface before glyphosate was applied.*

Results and Discussion

Germinability of seeds generally increased for all treatments from initiation of the experiment until September 14. There may have been a brief decline in germinability of seeds within berries that were treated with glyphosate but remained attached to the plants. After Sept 14, germinability of the seeds within untreated berries that were attached to plants declined, while germinability of seeds in berries that were removed from plants or treated with glyphosate continued to increase.

A possible explanation for the differences in germinability among treatments may be after-ripening. Hairy nightshade seeds initially shed from plants often exhibit very strong levels of primary dormancy, as exhibited with hairy nightshade seeds in this experiment on August 23 (Figure 1). As the season progressed, however, primary dormancy decreased for all seeds (germination increased). This trend continued for seeds in berries that had been removed from plants or treated with glyphosate, but not for those in berries that remained attached to plants. Germinability was particularly high for those seeds in berries that were both removed from plants (placed on soil) and treated with glyphosate.

These trends indicate that the removal of berries from plants and/or application of glyphosate to berries may have been interfering with seed maturation and the after-ripening process. Primary dormancy is essential for survival of many summer annual seeds so that seeds do not germinate in conditions unfavorable for growth (i.e. late summer and fall). The implication of this study is that hairy nightshade management will be improved if berries are removed from plants, particularity if they are treated with glyphosate. Removal of berries from plants and exposure to glyphosate may reduce primary dormancy in the seed and the potential survival of the seed during the winter. Further research is needed to document this trend, however, particularly during the winter months.

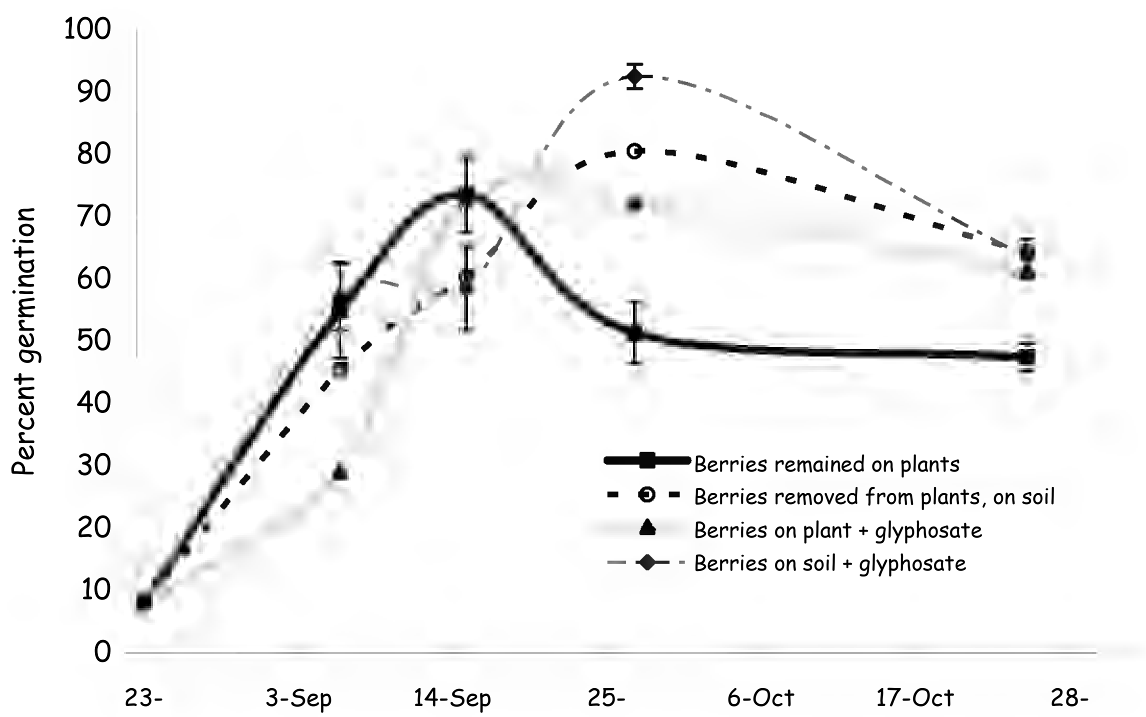

Figure 1. Effect of hairy nightshade berry treatment on seed germination potential.

Puncturevine Control in Snap Beans

Ed Peachey, Horticulture Department

The site was near Lebanon OR in 2005 on a silty clay loam soil with a pH of 6.2, CEC of 26.9 meq/100g soil, and OM of 8.06 %. Preplant herbicides were applied on June 14 and snap beans planted on the same day. PES herbicides were applied on June 15 and plots irrigated to incorporate the herbicides. POST treatments were applied on July 12, 2005 to beans with fully expanded 1st trifoliate leaves and the 2nd beginning to open. Pigweed was as much as 6 inches tall and puncturevine up to 3 inches in diameter.

Results

Puncturevine density at this site was highly variable. Estimates of control were made by comparing the number of plots where herbicides completely controlled puncturevine versus those that provided some or no control of puncturevine. Reflex herbicide controlled puncturevine, but tankmixes of Raptor and Basagran controlled puncturevine best. The soil applied herbicides, in general, did not control puncturevine well.

Table 1. Effect of Reflex and other herbicides on crop growth and weed control.

	Herbicide	Rate		Timing	Obs	Phytotoxicity		Growth reduction or stunting		Weed control (26-Jul)			
						18-Jul	*26-Jul*	*18-Jul*	*26-Jul*	Average	Black nightshade	Pigweed	Lambs-quarters
						-------0-10------		*--------%---------*		*--------------------- % control --------------------*			
1	Check				4	0.0	0.1	3	0	0	0	0	0
2	Reflex	8	oz	1st tri	4	1.5	0.3	4	3	84	84	89	88
3	Reflex	12	oz	1st tri	4	1.5	0.1	4	0	91	91	96	93
4	Reflex	16	oz	1st tri	4	2.0	0.3	5	3	89	89	91	85
5	Basagran	32	oz	1st tri	4	3.0	0.1	14	5	71	71	95	58
6	Raptor	4	oz	1st tri	4	3.3	0.4	13	0	97	97	100	100
	Basagran	32	oz	1st tri									
7	Reflex	16	oz	1st tri	4	4.0	0.1	24	0	91	91	100	86
	Basagran	32	oz	1st tri									
8	Reflex	12	oz	PES	4	1.3	0.0	3	0	76	76	76	75
9	Cobra	12	oz	PES	4	0.5	0.0	0	0	84	84	90	96
10	Outlook	11.5	d oz	PES	4	0.0	0.1	0	4	45	45	41	75
11	Outlook	23.0	d oz	PES	4	0.3	0.0	1.3	0	80	80	78	90
12	Valor	0.8	oz	PES	4	0.3	0.0	3	4	63	63	77	65
13	Sandea	0.68	d oz	PES	4	0.0	0.0	3	3	44	44	36	70
14	Prowl	39	oz	PES	4	0.5	0.0	3	0	81	81	85	74
15	Dual Magnum	16	oz	PPI	4	0.0	0.0	0	0	80	80	84	70
16	Dual Magnum	16	oz	PES	4	0.3	0.0	0	0	80	80	75	71
17	Eptam	64	oz	PPI	4	0.0	0.0	0	0	80	80	83	85
18	Treflan	16	oz	PPI	4	0.0	0.0	3	3	78	78	65	94
	FPLSD					1.2	0.2	6.1	ns	30	23	33	26

Table 2. Effect of Reflex herbicide on snap bean yield and weed control at harvest, Lebanon, OR 2005.

	Herbicide	Rate		Timing	Obs.	Stand	Biomass	Pod yield	Grade	Weed control at harvest			
										Average	Black nightshade	Pigweed	Lambs-quarters
						no./A	------------- *t/A*	-----------	*%1-4*	-------------------- *% control*			----------------------
1	Check				4	138100	11.8	5.3	67	0	0	0	0
2	Reflex	8	oz	1st tri	4	136800	17.3	9.0	44	79	88	88	89
3	Reflex	12	oz	1st tri	4	159400	19.8	10.4	48	88	95	91	86
4	Reflex	16	oz	1st tri	4	140100	18.5	8.8	52	91	96	90	93
5	Basagran	32	oz	1st tri	4	145400	13.3	6.4	56	60	95	51	98
6	Raptor	4	oz	1st tri	4	158700	17.3	9.8	49	95	96	99	98
	Basagran	32	oz	1st tri									
7	Reflex	16	oz	1st tri	4	149400	15.5	8.7	56	89	95	90	100
	Basagran	32	oz	1st tri									
8	Reflex	12	oz	PES	4	153400	19.0	9.7	49	68	73	68	69
9	Cobra	12	oz	PES	4	160700	20.5	10.9	46	78	93	95	66
10	Outlook	11.5	d oz	PES	4	150100	14.5	7.5	57	45	43	83	84
11	Outlook	23.0	d oz	PES	4	151400	19.0	8.8	53	74	80	86	77
16	Dual Magnum	16	oz		3	154900	18.7	10.1	51	78	56	90	85
	FPLSD					*ns*	*5.1*	*3*		*33*	*25*	*31*	*29*

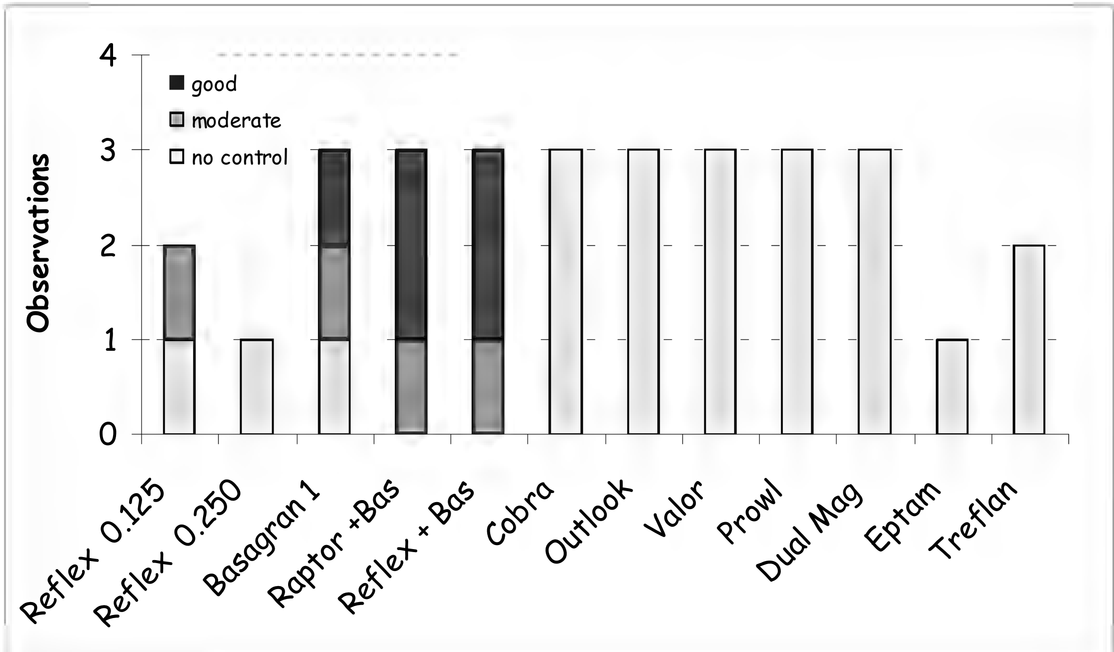

Figure 1. Herbicide effects on puncturevine survival. Different colored bars represent number of plots with good, moderate, or no control out of the 4 replications at this site.

Puncturevine Control in Sweet Corn

Ed Peachey, OSU Horticulture Dept

Introduction

Puncturevine is beginning to appear in significant densities along some field margins in row crops in the Valley. Puncturevine is known to colonize undisturbed areas in some areas of the Valley, but the invasion of row crop soil in highly disturbed systems on the West side is unusual. The objectives of this project were to evaluate the efficacy of common row crop herbicides for control of puncturevine. Impact herbicide was recently registered for weed control in sweet corn. The objectives of this project were to evaluate the weed control potential of this product for puncturevine.

Methods

The experiment was located on a Chehalis silty clay loam with a pH of 6.0, OM of 3.8% and CEC of 31.2 meq/100 g of soil. Plots were 10 by 30 ft arranged in a RCBD. The soil was pre-irrigated before planting because of very dry conditions in May. Eradicane was sprayed on selected plots and incorporated within a Dynadrive within 10 minutes. Rain promptly began to fall and created a less than perfect seed-bed. Sweet corn was planted on May 19 into very wet soil and PES herbicides applied on May 20. On June 16, all of the emerged puncturevine seedlings were flagged, and POST treatments were applied on June 20 to puncturevine that had 4-6 true leaves. Puncturevine survival was recorded on June 30, and seedlings counted, recorded and removed from the plot the remainder of the season.

Results

Puncturevine was not evenly distributed at this site, thus weed control evaluations were difficult to make. Nearly all of the puncturevine seedlings died after application of Impact and Callisto herbicides, but puncturevine continued to emerge and many began to produce seeds later in the season (Table 6). The low number of puncturevine recorded in the untreated plots was either do to the location of the plots (randomly assigned to areas with a low density of seeds), or possibly due to the other weeds that emerged faster and kept the soil temperatures low. Prowl + atrazine and Eradicane + Outlook produced the greatest number of seedlings, but once again it is unclear whether this was a plot placement or treatment effect. These plots were nearly devoid of other weeds, which may have encouraged puncturevine emergence.

Table 1. Puncturevine control with Impact herbicide, Lebanon, 2006.

	Herbicide	Rate		Timing	Date	Puncturevine density before EPOST app. (17-June)		EPOST control 2 WAT (30-June)	Cumulative puncturevine density (through 10-Aug)
						# plots	*no./plot*	*%*	*no./plot*
1	Untreated					*1*	0.5	-	1.5
2	Eradicane	5	pts	PPI	19-May	*0*	0	-	0.3
3	Outlook	1	pt	PRE	20-May	*0*	0	-	1.5
4	Dual Magnum	2	pts	PRE	20-May	*0*	0	-	1.8
5	Eradicane	5.0	pts	PPI	19-May	*2*	10.5	-	14.8
	Outlook	16	oz	PES	20-May				
6	Outlook	16	oz	PRE	20-May	*1*	0.3	-	1.0
	Atrazine	10	oz	PRE	20-May				
7	Prowl H2O	2.0	pts	PRE	20-May	*3*	7.8	-	31.3
	Atrazine	0.6	pt	PRE	20-May				
8	Outlook	16	oz	PRE	20-May	*1*	0.8	100	1.8
	Impact	0.75	oz	EPOST	17-Jun				
	NIS	0.25	%	EPOST	17-Jun				
	UAN 32%	2.5	%	EPOST	17-Jun				
9	Outlook	16	oz	PRE	20-May	*2*	1.5	100	1.5
	Impact	0.75	oz	EPOST	17-Jun				
	Atrazine	10	oz	EPOST	17-Jun				
	NIS	0.25	%	EPOST	17-Jun				
	UAN 32%	2.5	%	EPOST	17-Jun				
10	Impact	0.75	oz	EPOST	17-Jun	*0*	0	-	0.5
	Outlook	12.0	oz	EPOST	17-Jun				
	Atrazine	10	oz	EPOST	17-Jun				
	NIS	0.25	%	EPOST	17-Jun				
	UAN 32%	2.5	%	EPOST	17-Jun				
11	Callisto	3	oz	EPOST	17-Jun	*2*	0.8	100	2.0
	Outlook	12.0	oz	EPOST	17-Jun				
	Atrazine	10	oz	EPOST	17-Jun				
	UAN 32%	2.5	%	EPOST	17-Jun				
12	Impact	0.75	oz	EPOST	17-Jun	*2*	1.3	75	3.0
	MSO	1.0	%	EPOST	17-Jun				
	UAN 32%	2.5	%	EPOST	17-Jun				
13	Accent	0.67	oz	EPOST	17-Jun	*1*	2.0	88	1.3
	Atrazine	10	oz	EPOST	17-Jun				
	COC	1	%	EPOST	17-Jun				
14	Atrazine			PRE	20-May	*2*	6.8	-	10.5
	FPLSD (0.05)						ns	47	17.0

Table 2. Application data for Lebanon site, 2006.

Date	Friday, May 19, 2006	Saturday, May 20, 2006	Saturday, June 17, 2006
Crop stage		Planted 5-19 into very wet pre-irrigated soil with rainfall following during the night	8" max, v3, 5-6 leaf
Weeds and growth stage			
Puncturevine			4-6 lf
Pigweed			4-6 lf
Nightshade			4-6 lf
Lambsquarters			4-8 lf
Application timing	PPI Eradicane	PES	EPOST
Start/end time	8:30-10:00	7-7:45	7:20-8 AM
Air temp/soil temp (2")/surface	68.5/70.5/80.1	56/60/59	62/64/65
Rel humidity	86%	92%	82%
Wind direction/velocity	1	0-1 W	0-2 NW
Cloud cover	Partly cloudy	Partly cloudy	90
Soil moisture	Damp	Very, very, wet	Dry crusted
Plant moisture	-	-	Dry
Sprayer/PSI	BP 30	BP 30	BP 40
Mix size	2100	2100	2100
Gallons H20/acre	20	20	20
Nozzle type	5, 8003	5, 8003	5, 8003
Nozzle spacing and height	20/18	20/18	20/18
Soil inc. method/implement	Dynadrive within 10 minutes		

Puncturevine Control in Right-Of-Way Areas

Richard Affeldt and Claudia Campbell
Central Oregon Agriculture Research Center, Madras, OR

Abstract

Control of puncturevine (*Tribulus terrestris*) in areas adjacent to cropland is difficult because seeds can germinate throughout the summer then rapidly flower and produce mature seed. Six soil active herbicides were tested for residual puncturevine control on two roadside locations near Prineville and Madras. Across the two locations, puncturevine control was consistently good with imazapyr plus diuron (Sahara).

Introduction

Control of puncturevine (*Tribulus terrestris*) in areas adjacent to cropland is difficult because seeds can germinate throughout the summer then rapidly flower and produce mature seed. Many postemergence herbicides control puncturevine well, but to prevent viable seed formation requires treating infested areas every three weeks throughout the summer. It is not reasonable for most landowners to treat this frequently. Puncturevine control in right-of-ways is further complicated by the gravelly soil conditions that typically characterize these areas. These soil conditions limit the efficacy of soil-active herbicides. The objective of these experiments was to evaluate efficacy on puncturevine of six soil-active herbicides.

Methods and Materials

Six soil active herbicides were tested for residual puncturevine control on two roadside locations near Prineville and Madras. Treatments were applied preemergence to the puncturevine and postemergence to the prickly lettuce (*Lactuca serriola*) on April 7 and May 9, 2006, respectively at rates currently registered for non-cropland use. Plots were 7 ft by 15 ft with three replications arranged as randomized complete blocks. Treatments were applied with a CO_2 backpack sprayer delivering 20 gpa operating at 20 psi and 3 mph. Herbicide efficacy was determined by taking visual evaluations using a 0 to 100% standard rating scale, with 0% being no control.

Results and Discussion

Precipitation varied between the two sites and the timing of precipitation relative to application likely had a strong influence on herbicide efficacy. At Prineville, 0.38 inches of precipitation fell 3 days after the April 7 application. At Madras, 0.21 inches of precipitation fell 10 days after the May 9 application. There was only one germination flush of puncturevine at each location. In Prineville, flumioxazin (Chateau), imazapyr plus diuron, and oryzalin (Surflan) controlled 100% of the puncturevine 117 days after application (Table 1). Also in Prineville, hexazinone (Velpar), flumioxazin, and imazapyr plus diuron controlled 97% or more of the prickly lettuce. At Madras only imazapyr plus diuron controlled 100% of the puncturevine 92 days after application. Across the two locations, puncturevine control was consistently good with imazapyr plus diuron.

Table 1. Puncturevine and prickly lettuce control on August 4 from herbicide applications on roadsides near Madras and Prineville, 2006.

Treatment†	Rate (lb ai or ae/A)	Prineville		Madras	
		Puncturevine	Prickly lettuce	Puncturevine	Prickly lettuce
		--------------------- % Control	---------------------		
Hexazinone	3.0	67	100	33	67
Chlorsulfuron	0.14	50	33	87	43
Flumioxazin	0.38	100	97	73	7
Sulfentrazone	0.38	33	33	26	0
Imazapyr +	1.0 +				
Diuron	8.0	100	100	100	25
Oryzalin	6.0	100	50	33	10

† Trade names commonly used for these herbicides: hexazinone = Velpar, chlorsulfuron = Telar, flumioxazin = Chateau, sulfentrazone = Spartan, imazapyr + diuron = Sahara, and oryzalin = Surflan.

Seed Predation Potential in Field Crops

Alysia Greco and Ed Peachey, OSU Horticulture Dept

Introduction

Regulation of weed seed banks in agricultural systems primarily involves management of seed input from seed rain, and seed removal from mortality and germination. While seed rain, germination, and emergence are managed using a number of methods such as tillage and herbicides, management of seed mortality is frequently overlooked. Seed predation by invertebrates such as carabid beetles is a key source of mortality in some cropping systems.

Methods

During the summer and fall of 2006 we began to measure the seed predation potential of carabid beetles, and the use of crop and tillage rotational strategies to promote the establishment of seed predators in vegetable cropping systems. Sites were located both in western Oregon (5) and eastern Washington (4). Western Oregon sites were primarily conventional corn, beans and grass fields. Eastern Washington sites consisted of both organic and conventional corn and carrot fields. Seed predation stations were placed in several areas of the field, along edges and in the middle. Each station included a pitfall trap to determine species in the field, and three types of exclosures over weed seed trays to calculate seed predation. The exclosures included one designed to exclude all mammals (mice) and insects, one that allowed insects but excluded mammals, and one that allowed entry of both mammals and insects. Fifty pigweed seeds were placed on 2 inch dia. Petri dishes under each exclosure and the number remaining after 7 to 14 days was recorded. Time lapse photography also was used to monitor removal of seeds by carabids and other invertebrates.

Results

Seeds were removed from both the mammal exclosures (allow arthropod entry) and the total exclosures, although the number of seeds removed from the mammal exclosures was higher than the total exclosures. The number of seeds removed per day and the number of seed predators caught per day was greatest during August (Figure 2). The number of seeds removed and number of seed predators caught per day was greater in the bean crop than in the corn or carrots. The most prevalent species caught in the fields included *Pterosticus melanarius, Harpalus pennsylvanicus, Harpalus affinius, Amara aenea,* and *Agonum melanarium*. *P. melanarius* was the primary large carabid species on the west side and *H. pennsylvanicus* was the primary large species in the eastern Washington fields.

Discussion

Regression analysis suggests a correlation between number of insects and seeds removed from the total exclosures. Although seeds were removed from the seed stations by invertebrates as predicted, they were also removed from exclosures designed to exclude both insects and mammals. Time lapse photography suggests that the removal may be due to seed sticking to earthworms and slugs that crawl across the seed plates. Modifications to the exclosures will include a bottom barrier to prevent both earthworms and soil dwelling and burrowing arthropods entry by emerging through the soil surface.

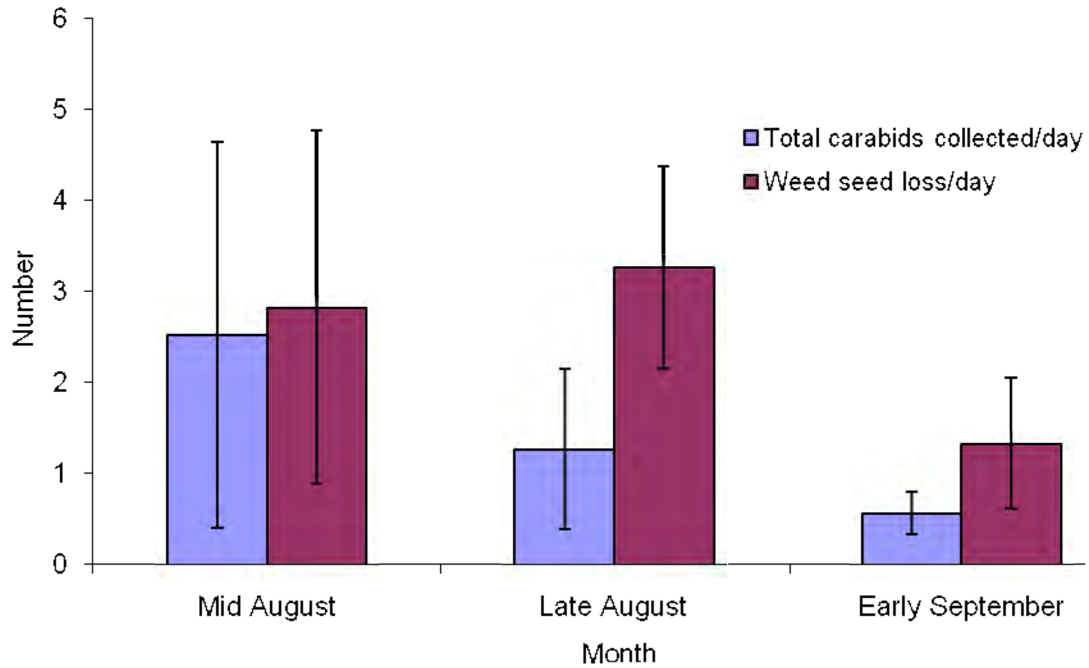

Figure 1. Effect of collection date on number of carabids (potential seed predators) trapped and weed seed loss per day averaged over both East and West sites. Error bars are standard deviation (n=40 to 50).

SNAP BEANS

Reflex (Fomesafen) Efficacy & Tolerance in Snap Beans

E. Peachey, Horticulture Dept. OSU

Methods

Snap beans (OR 91G) were planted June 14 2005 after the extended wet and late spring. 180,000 seeds were planted per acre on 30 inch rows. Fertilizer (12/29/10) was banded at the rate of 433 lbs/A next to row at planting. PES herbicides were applied on June 15 and incorporated with 0.5 inch of water, there were 4 replications. POST Reflex applications were made on July 10 to 1st trifoliate beans. LPOST treatments were applied on July 5. The weeded check was hoed one time. No other weed control measures applied to plots. Beans harvested from 8.2 ft of row on August 17. Plots from the first and 2nd rep, and 3 and 4th reps were combined for grading. Higher grade number indicates later maturity.

Results

Reflex caused significant injury to snap bean shortly after application, but symptoms dissipated quickly and were only slightly visible 12 DAT (Table 2). Tankmixing Basagran with Reflex increased injury substantially. Separating the application of Reflex and Basagran by 5 days reduced crop injury (Table 2). Reducing the Basagran rate to 0.5 lbs ai/A reduced crop injury but did not jeopardize weed control (Table 3). Yield was best with Reflex at 0.250 lb ai/A + Basagran at 0.5 lbs ai/A, and was 2 t/A larger than Raptor + Basagran (0.5 lb ai/A) and the weeded check (Table 4, Figure 1). Barnyardgrass populations at this site were highly variable. Reflex provided good control of Powell amaranth and hairy nightshade.

Table 1. Weather following application.

Date	Activity	Weather	T max	T min
7/9/2005		Drizzle	68	55
7/10/2005	POST applied (1st tri)	Drizzle	72	55
7/11/2005		Drizzle	73	56
7/12/2005	3 hr irrigation (1.2 inch)	Cool and cloudy	76	58
7/13/2005		Cool and cloudy	76	53
7/14/2005		Very warm and windy	76	53
7/15/2005	LPOST applied (2nd tri)	Very warm and dry	85	50
7/16/2005		Very warm and dry	88	51

Table 2. Snap bean tolerance to Reflex.

	Herbicide	Timing	Rate	Obs.	Emergence	Phytotoxicity				Growth reduction (stunting)		
						4 DAT	8 DAT	12 DAT	26 DAT	8 DAT	12 DAT	26 DAT
			lbs ai/A		*no/3 ft or row*	*------------ 0-10 rating -------------*				*-------------- % --------------*		
1	Check	-	-	4	24	0	0	0	0	0	0	8
2	Reflex	1st tri	0.125	4	-	4	2	1	0	1	8	0
3	Reflex	1st tri	0.188	4	-	4	2	0	0	4	9	0
4	Reflex	1st tri	0.250	4	-	5	2	1	0	10	11	3
5	Reflex Basagran	1st tri 1st tri	0.125 1	4	-	6	3	2	0	16	18	0
6	Reflex Basagran	1st tri 1st tri	0.188 1.0	4	-	5	3	1	0	13	18	3
7	Reflex Basagran	1st tri 1st tri	0.250 1.0	4	-	6	3	2	0	20	19	5
8	Basagran	1st tri	0.5	4	-	2	1	0	0	3	8	8
9	Basagran	1st tri	1.0	4	-	3	2	1	0	9	10	9
10	Reflex Basagran	1st tri 1st tri	0.188 0.5	4	-	5	3	2	0	15	15	0
11	Reflex Basagran	1st tri 1st tri	0.250 0.5	4	-	6	3	2	0	13	9	0
12	Raptor	1st tri	0.030	4	-	4	3	2	0	20	30	3
13	Raptor Basagran	1st tri 1st tri	0.030 0.5	4	- -	2	1	1	0	6	11	0
14	Raptor Basagran	1st tri 1st tri	0.030 1.0	4	-	4	2	1	0	9	11	5
15	Reflex	PES	0.188	4	27	0	1	0	0	0	1	3
16	Reflex	PES	0.250	4	28	0	0	0	0	0	3	3
17	Cobra	PES	0.1875	4	28	0	0	0	0	0	3	3
18	Outlook	PES	0.5625	4	27	1	0	0	0	0	0	3
19	Outlook	PES	1.125	4	27	1	0	0	0	0	3	0
20	Reflex Basagran	1st tri 2nd tri	0.250 1.0	4	-	-[a]	3	2	0	10	13	0
21	Weeded	-	-	4	27	0	0	0	0	0	3	0
	FPLSD(0.05)				ns	1.3	0.9	0.9	ns	7	8.8	6
	All POST herbicides included 0.25% NIS											*P=0.06*

[a] Basagran not applied at this observation time.

Table 3. Weed control with Reflex.

	Herbicide	Timing	Rate	Obs	Weed control 7/22/2005 (12DAT) Pig-weed	Hairy nightshade	Lambs-quarters	Barnyard-grass	Avg.	8/5/2005 (26 DAT) Pig-weed	Hairy nightshade	Lambs-quarters	Barnyard-grass	Avg.	8/20/2005 (41 DAT) Pig-weed	Hairy nightshade	Lambs-quarters	Barnyard-grass	Avg.
			lbs ai/A		*% control*														
1	Check	-	-	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Reflex	1st tri	0.125	4	99	96	93	48	93	98	87	69	50	77	91	91	63	63	76
3	Reflex	1st tri	0.188	4	100	98	97	25	93	100	98	90	61	85	90	93	80	66	76
4	Reflex	1st tri	0.250	4	99	95	100	65	95	99	97	96	86	93	90	90	91	80	83
5	Reflex	1st tri	0.125	4	95	98	100	63	94	97	98	98	68	90	89	91	89	63	75
	Basagran	1st tri	1																
6	Reflex	1st tri	0.188	4	96	99	99	79	97	96	98	95	85	89	94	91	89	83	83
	Basagran	1st tri	1																
7	Reflex	1st tri	0.250	4	100	98	100	43	94	100	97	94	49	80	96	93	93	24	68
	Basagran	1st tri	1.0																
8	Basagran	1st tri	0.5	4	0	71	88	0	56	13	95	99	62	29	15	88	90	13	28
9	Basagran	1st tri	1.0	4	28	81	93	23	58	21	95	99	71	35	25	85	94	17	25
10	Reflex	1st tri	0.188	4	99	98	98	100	96	98	98	98	94	96	92	91	84	90	86
	Basagran	1st tri	0.5																
11	Reflex	1st tri	0.250	4	99	99	100	76	95	99	98	100	66	91	90	90	93	78	85
	Basagran	1st tri	0.5																
12	Raptor	1st tri	0.030	4	98	98	89	96	93	99	100	88	85	88	98	96	86	89	89
13	Raptor	1st tri	0.030	4	99	100	95	93	95	100	99	95	92	96	96	95	88	92	89
	Basagran	1st tri	0.5																
14	Raptor	1st tri	0.030	4	100	100	100	97	99	100	100	100	97	98	98	97	96	94	94
	Basagran	1st tri	1.0																
15	Reflex	PES	0.188	4	85	49	75	75	65	73	36	66	98	44	64	35	48	67	48
16	Reflex	PES	0.250	4	88	70	92	73	79	87	52	81	80	66	94	49	70	40	55
17	Cobra	PES	0.1875	4	98	95	64	50	83	99	95	31	90	70	93	96	28	24	61
18	Outlook	PES	0.5625	4	79	50	48	100	64	66	48	45	99	45	78	50	40	100	43
19	Outlook	PES	1.125	4	96	81	90	100	83	94	79	89	100	78	94	69	70	100	71
20	Reflex	1st tri	0.250	4	100	100	100	70	96	99	100	99	87	98	95	97	93	68	85
	Basagran	2nd tri	1.0																
21	Weeded	-	-	4	91	80	93	95	89	69	68	85	91	73	83	76	90	94	74
	FPLSD(0.05)				17	20	25	47	14	20	22	27	43	22	17	25	27	46	19

Table 4. Effect of Reflex and other herbicides on snap bean yield.

.Herbicide		Timing	Rate	Obs.	Harvest				
					Plant stand at harvest	Crop biomass	Pod yield	Grade	
								Obs.	1-4 sieve
			lbs ai/A		*no/A*	*t/A*	*t/A*		%
1	Check	-	-	4	152500	11.9	6.1	2	28
2	Reflex	1st tri	0.125	4	153000	17.1	9.7	2	23
3	Reflex	1st tri	0.188	4	157200	16.6	9.4	2	25
4	Reflex	1st tri	0.250	4	128600	14.3	8.7	2	23
5	Reflex Basagran	1st tri 1st tri	0.125 1	4	139700	17.0	9.7	2	36
6	Reflex Basagran	1st tri 1st tri	0.188 1	4	159400	17.3	10.4	2	24
7	Reflex Basagran	1st tri 1st tri	0.250 1.0	4	145600	17.7	10.4	2	26
8	Basagran	1st tri	0.5	4	142900	13.3	7.1	2	33
9	Basagran	1st tri	1.0	4	148700	13.5	7.5	2	31
10	Reflex Basagran	1st tri 1st tri	0.188 0.5	4	166800	16.6	9.7	2	20
11	Reflex Basagran	1st tri 1st tri	0.250 0.5	4	158800	19.7	11.6	2	22
12	Raptor	1st tri	0.030	4	146600	17.7	7.7	2	63
13	Raptor Basagran	1st tri 1st tri	0.030 0.5	4	155600	17.1	9.6	2	20
14	Raptor Basagran	1st tri 1st tri	0.030 1.0	4	143400	16.7	9.9	2	22
15	Reflex	PES	0.188	4	137600	11.6	6.3	2	33
16	Reflex	PES	0.250	4	141300	16.9	9.5	2	22
17	Cobra	PES	0.1875	4	145000	18.3	10.2	2	25
18	Outlook	PES	0.5625	4	132300	14.8	7.1	2	38
19	Outlook	PES	1.125	4	162600	16.4	9.4	2	20
20	Reflex Basagran	1st tri 2^{nd} tri	0.250 1.0	4	180600	16.5	9.8	2	24
21	Weeded			4	145000	16.9	8.9	2	34
	FPLSD(0.05)				ns	ns	3.1		12

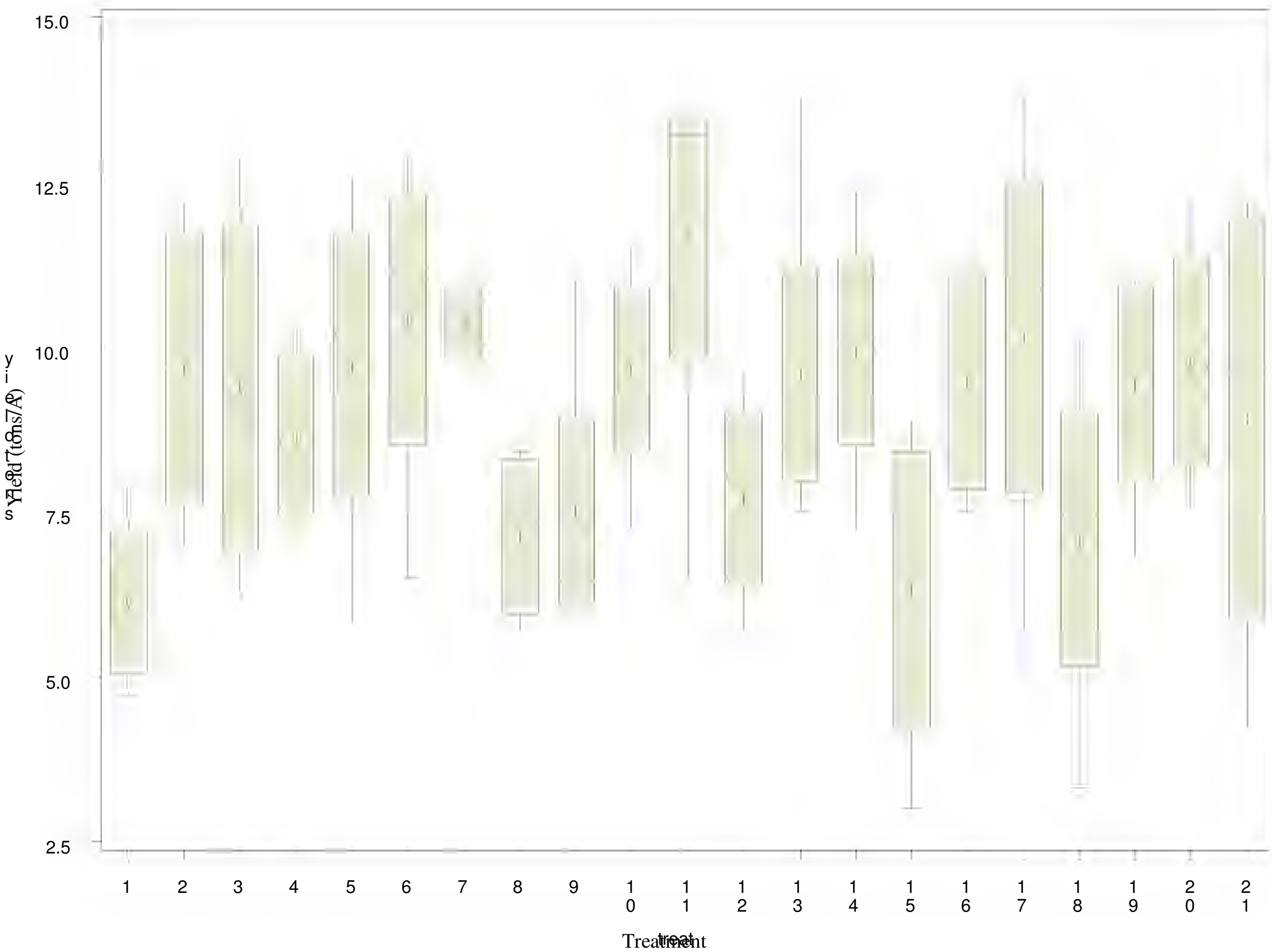

Figure 1. Means, median, and range of observations for treatment effects on snap bean yield (t/A).

Table 5. Site characteristics and application data.

Plot size/exp. design	10*25	4 reps	RCBD
Proceeding crop	Snap beans		
Soil test	pH 6.4	OM 6.53 LOI	CEC 26.5 meq/100g soil
Soil type	Silt loam	15% sand; 64% silt; 21% clay	
Herbicide application data			
Date	June 15, 2005	July 10, 2005	July 15, 2005
Crop stage		2nd trifoliate beginning to show, beans are large, up to 8 inches tall	2nd tri, 3rd opening
Weeds		See below	Very small survivors
Herbicide/treatment			Tr. 20 Basagran only
Application timing	PES	POST	LPOST
Start/end time	5:30 to 6:30 AM	7-8:30 A	7:15-7:30
Air temp/soil temp (2")/surface	52/55/54	67/68/68	68/68/67
Rel humidity	85%	100%	85%
Wind direction/velocity	0	0-1 SW	0
Cloud cover	Clear	100%	Clear
Soil moisture	soil dry	Wet	Soil damp
Plant moisture		drizzle before and after application	Very wet
Sprayer/PSI	BP 40PSI	BP 40PSI	BP 40PSI
Mix size	2100	2100	2100
Gallons H20/acre	20	20	20
Nozzle type	8002	8002	8002
Nozzle spacing and height	20/18	20/18	20/18
Soil inc. method/implement			
Rain 1 day before		Drizzle	None
Rain 1 day after		Drizzle	None
Weed growth stages			
AMAPO		0-3 " Coty -7 Leaf	
SOLSA		0-2 " Coty - 8 L	
CHEAL		0-3 " Coty - 6 L	

BEETS

Weed Control in Table Beets, 2005

Ed Peachey, Horticulture Department, OSU

Methods

Field experiments were conducted in Dayton, OR and at the OSU Vegetable Research Farm in Corvallis. The soil at Dayton was a silt loam with a pH of 5.2, OM of 5.2% (LOI) and CEC of 14.7 meq g/soil. Roneet was applied on May 31, 2005 and incorporated within 10 minutes with a harrow to designated treatments. Beets were planted on 18 inch rows on June 1 and PPS (post-plant surface) treatments applied June 3. Plots were 10 ft wide by 30 feet long. Herbicides were incorporated with irrigation water shortly after planting. POST treatments were applied at the 2-leaf or 4-leaf stage depending on treatment. Beets were pulled on August 20 from a 5 ft section of one of the middle rows in 4-row bed.

At Corvallis, Roneet was incorporated in all plots June 14 and beets planted with a Gaspardo planter. Pyramin was applied PPS to all plots to help reduce weed competition with the crop. Dual Magnum treatments were applied PPS on June 15, then plots irrigated to incorporate the herbicide on June 17. Plots were 30' long and four rows wide with 18" between rows and 2' between the outside rows of each plot. Additional fertilizer (260 lbs 12-29-10) was dribbled on the surface between rows at planting. Beets were harvested on Sept. 1 from 10 ft. of one row in each plot and graded.

Results

Dayton, 2005.

Dual Magnum applied to table beets at 0.64 lbs ai/A reduced beet growth slightly when used in combination with Roneet or Pyramin (Tr. 1-10, Table 1). Table beet yield was substantially improved when Dual Magnum was applied after Roneet or tank mixed with Pyramin (Table 2, Figure 1). Dual Magnum treatments (Tr. 6 and 8) yielded more than Pyramin, Roneet, or Pyramin+Roneet treatments. The largest yield was Roneet+Pyramin+Dual Magnum (23 t/A), a 6 t/A increase over the conventional treatment of Roneet and Pyramin. Increased yield was directly related to improved weed control. Outlook applied after Dual Magnum caused a significant yield decrease.

Alternative treatments with Spinaid, Stinger, and Upbeet applied POST after Dual Magnum treatments increased both visual injury symptoms and reduced growth. In most cases, the beets recovered and yielded as well as the check. Exceptions were Dual Magnum (PPS) followed by Outlook (EPOST), which had good weed control (95%) but only yielded 16.9 tons/A.

Corvallis, 2005.

Dual Magnum applied to table beets at 0.64 lbs ai/A reduced beet growth slightly early in the season (Table 4). Table beet yield increased with increasing rates of Dual Magnum. Even though Roneet and Pyramin were applied to the plots, smartweed densities were very high. Dual Magnum controlled smartweed at the higher rates, thus yield increased with increasing Dual Magnum rates.

Table 1. Effect of herbicides on table beet growth and weed control to mid-season, Dayton, OR, 2005.

	Herbicide	Timing	Date	Rate	Obs.	June 28 (1 WA POST1)				July 23 (4 WA POST2)				
						Emer-gence	Phyto-toxicity	Stunting	Weed control	Phyto-toxicity	Stunting	Weed control		
												Pig-weed	Lambs-quarters	Avg. weed control
				lbs ai/A	*N*	no/3 ft	0-10	%	%	0-10	%	%		
1	Roneet	PPI	31-May	3.0	4	37	0	3	49	0	11	41	50	30
2	Roneet	PPI	31-May	3.0	4	48	0	1	85	0	0	95	100	84
	Pyramin	PPS	3-Jun	3.3										
3	Pyramin	PPS	3-Jun	3.3	4	43	0	0	79	0	0	48	97	51
4	Roneet	PPI	31-May	3.0	4	47	1	0	84	0	0	100	50	71
	Dual Mag	PPS	3-Jun	0.3										
5	Roneet	PPI	31-May	3.0	4	41	2	9	96	0	4	100	100	97
	Dual Mag	PPS	3-Jun	0.64										
6	Dual Mag	PPS	3-Jun	0.64	4	42	0	4	94	0	3	98	68	85
7	Dual Mag	PPS	3-Jun	0.3	4	34	0	4	97	0	10	95	95	95
	Pyramin	PPS	3-Jun	3.3										
8	Dual Mag	PPS	3-Jun	0.64	4	41	1	4	96	0	3	100	99	92
9	Dual Mag	PPS	3-Jun	0.6	4	41	0	10	99	0	10	99	99	99
	Pyramin	PPS	3-Jun	3.3										
10	Roneet	PPI	31-May	3.0	4	40	0	8	99	0	0	99	95	96
	Pyramin	PPS	3-Jun	3.3										
	Dual Mag	PPS	3-Jun	0.64										
11	Dual Mag	PPS	3-Jun	0.64	3	47	1	10	96	0	15	100	100	100
	Spinaid	POST2	28-Jun	1.0										

Table 1 Cont'd

	Herbicide	Timing	Date	Rate	Obs.	June 28 (1 WA POST1)				July 23 (4 WA POST2)				
						Emer-gence	Phyto-toxicity	Stunting	Weed control	Phyto-toxicity	Stunting	Weed control		
												Pig-weed	Lambs-quarters	Avg. weed control
				lbs ai/A	*N*	no/3 ft	0-10	%	%	0-10	%	------------------- % ---------------		
12	Dual Mag	PPS	3-Jun	0.64	4	37	3	31	100	0	16	100	100	100
	Spinaid	POST1	21-Jun	0.5										
	Spinaid	POST2	28-Jun	0.5										
13	Dual Mag	PPS	3-Jun	0.64	4	41	2	18	99	0	13	100	100	100
	Spinaid	POST1	21-Jun	0.33										
	Spinaid	POST2	28-Jun	0.33										
14	Dual Mag	PPS	3-Jun	0.64	4	43	1	14	99	0	9	100	100	100
	Outlook	POST1	21-Jun	0.54										
	Stinger	POST1	21-Jun	0.19										
15	Dual Mag	PPS	3-Jun	0.64	4	43	3	20	99	0	13	100	100	100
	Dual Mag	POST1	21-Jun	0.32										
	Spinaid	POST1	21-Jun	0.33										
16	Dual Mag	PPS	3-Jun	0.64	4	40	0	1	91	0	0	90	88	89
	Stinger	POST1	21-Jun	0.05										
17	Dual Mag	PPS	3-Jun	0.64	3	45	0	7	95	0	8	97	97	98
	Stinger	POST1	21-Jun	0.09										
18	Dual Mag	PPS	3-Jun	0.64	4	43	0	1	95	0	5	99	83	92
	Stinger	POST1	21-Jun	0.19										
19	Dual Mag	PPS	3-Jun	0.64	4	41	2	9	99	0	4	100	100	100
	Spinaid	POST1	21-Jun	0.33										
	Stinger	POST1	21-Jun	0.05										

Table 1 cont'd

	Herbicide	Timing	Date	Rate	Obs.	June 28 (1 WA POST1)				July 23 (4 WA POST2)				
						Emer-gence	Phyto-toxicity	Stunting	Weed control	Phyto-toxicity	Stunting	Weed control		
												Pig-weed	Lambs-quarters	Avg. weed control
				lbs ai/A	*N*	no/3 ft	0-10	%	%	0-10	%	-------------------- % ----------------		
20	Dual Mag	PPS	3-Jun	0.64	4	38	1	15	100	0	18	100	100	100
	Spinaid	POST1	21-Jun	0.33										
	Stinger	POST1	21-Jun	0.09										
21	Dual Mag	PPS	3-Jun	0.64	4	35	1	20	100	0	15	100	100	100
	Spinaid	POST1	21-Jun	0.33										
	Stinger	POST1	21-Jun	0.19										
22	Dual Mag	PPS	3-Jun	0.64	4	42	4	38	100	0	19	100	99	100
	Betamix	POST1	21-Jun	0.33										
	Stinger	POST1	21-Jun	0.047										
23	Dual Mag	PPS	3-Jun	0.64	4	41	2	15	98	0	5	100	95	99
	Outlook	POST1	21-Jun	0.54										
24	Dual Mag	PPS	3-Jun	0.64	4	36	4	33	100	0	23	100	100	100
	Outlook	POST1	21-Jun	0.54										
	Spinaid	POST1	21-Jun	0.33										
25	Dual Mag	PPS	3-Jun	0.64	4	43	5	45	100	0	29	100	100	100
	Outlook	POST1	21-Jun	0.54										
	Spinaid	POST1	21-Jun	0.33										
	Stinger	POST1	21-Jun	0.09										
26	Outlook	POST1	21-Jun	0.54	4	48	5	30	84	0	18	55	88	57
	Stinger	POST1	21-Jun	0.09										
	Upbeet	POST1	21-Jun	0.031										

	Herbicide	Timing	Date	Rate	Obs.	June 28 (1 WA POST1)				July 23 (4 WA POST2)				
						Emer-gence	Phyto-toxicity	Stunting	Weed control	Phyto-toxicity	Stunting	Weed control		
												Pig-weed	Lambs-quarters	Avg. weed control
				lbs ai/A	*N*	no/3 ft	0-10	%	%	0-10	%	-------------------- % ----------------		
27	Dual Mag	PPS	3-Jun	0.64	4	43	3	23	100	0	13	99	100	99
	Upbeet	POST1	21-Jun	0.031										
	COC													
28	Dual Mag	PPS	3-Jun	0.64	4	48	3	30	100	0	6	100	100	100
	Upbeet	POST1	21-Jun	0.063										
	COC													
29	Unweeded				4	41	0	0	0	0	15	0	0	0
30	Weeded				4	40	0	0	0	0	5	100	100	99
	FPLSD (0.05)					ns	1	11	13	ns	13	18	27	17

Table 2. Effect of herbicides on weeds and table beet yield, Dayton, OR, 2005.

	Herbicide	Timing	Date	Rate	Rate	Cost of herbicide	Total cost of treatment	Obs.	Yield (27-Aug)			Weed control at harvest		
									No. roots	Yield	Avg. wt of beets	Pigweed	Lambs-quarters	Avg. weed control
					lbs ai/A	---------- *$/A* --------------			*No./5 ft*	*t/A*		------------ % ---------------		
1	Roneet	PPI	31-May	4.00 pts	3.0	26	26	4	19	4.8	0.098	8	20	8
2	Roneet	PPI	31-May	4.00 pts	3.0	26		4	43	16.9	0.181	53	89	60
	Pyramin	PPS	3-Jun	5.00 lbs	3.3	83	109							
3	Pyramin	PPS	3-Jun	5.00 lbs	3.3	83	83	4	30	10.0	0.141	38	60	40
4	Roneet	PPI	31-May	4.00 pts	3.0	26		4	46	19.5	0.201	93	62	74
	Dual Mag	PPS	3-Jun	0.33 pts	0.3	4	30							
5	Roneet	PPI	31-May	4.00 pts	3.0	26		4	45	21.3	0.217	96	98	94
	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9	35							
6	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9	9	4	45	18.0	0.192	84	91	74
7	Dual Mag	PPS	3-Jun	0.33 pts	0.3	4		4	35	17.5	0.234	83	98	83
	Pyramin	PPS	3-Jun	5.00 lbs	3.3	83	87							
8	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9	9	4	44	19.8	0.206	95	96	89
9	Dual Mag	PPS	3-Jun	0.67 pts	0.6	9		4	43	19.4	0.211	95	96	93
	Pyramin	PPS	3-Jun	5.00 lbs	3.3	83	92							
10	Roneet	PPI	31-May	4.00 pts	3.0	26		4	48	23.0	0.225	94	94	93
	Pyramin	PPS	3-Jun	5.00 lbs	3.3	83								
	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9	118							
11	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		3	37	19.2	0.253	62	100	86
	Spinaid	POST2	28-Jun	6.00 pts	1.0	114	123							
12	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	36	17.3	0.222	98	100	98
	Spinaid	POST1	21-Jun	3.00 pts	0.5	57								
	Spinaid	POST2	28-Jun	3.00 pts	0.5	57	123							

Table 2 cont'd

	Herbicide	Timing	Date	Rate	Rate	Cost of herbicide	Total cost of treatment	Obs.	Yield (27-Aug)			Weed control at harvest		
									No. roots	Yield	Avg. wt of beets	Pigweed	Lambs-quarters	Avg. weed control
					lbs ai/A	*---------- $/A*	*--------------*		*No./5 ft*	*t/A*			*------------ % ---------------*	
13	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	43	19.3	0.205	96	100	99
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38								
	Spinaid	POST2	28-Jun	2.00 pts	0.33	38	85							
14	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	54	22.9	0.191	96	98	96
	Outlook	POST1	21-Jun	0.72 pts	0.54	13	22							
	Stinger	POST1	21-Jun	0.500 pts	0.19	30	52							
15	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	42	17.3	0.193	94	100	95
	Dual Mag	POST1	21-Jun	0.33 pts	0.32	4								
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38	51							
16	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	48	20.5	0.198	91	79	81
	Stinger	POST1	21-Jun	0.125 pts	0.05	7.5	16							
17	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		3	44	22.1	0.233	92	90	90
	Stinger	POST1	21-Jun	0.250 pts	0.09	15	24							
18	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	53	23.9	0.212	93	84	86
	Stinger	POST1	21-Jun	0.500 pts	0.19	30	39							
19	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	39	19.5	0.241	94	99	94
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38								
	Stinger	POST1	21-Jun	0.125 pts	0.05	7.5	54							
20	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	40	16.1	0.183	94	100	95
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38								
	Stinger	POST1	21-Jun	0.250 pts	0.09	15	62							
21	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	39	20.5	0.245	94	95	91
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38								
	Stinger	POST1	21-Jun	0.500 pts	0.19	30	77							

Table 2 cont'd

	Herbicide	Timing	Date	Rate	Rate	Cost of herbicide	Total cost of treatment	Obs.	Yield (27-Aug)			Weed control at harvest		
									No. roots	Yield	Avg. wt of beets	Pigweed	Lambs-quarters	Avg. weed control
					lbs ai/A	---------- $/A	--------------		No./5 ft	t/A		------------ %	---------------	
22	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	43	18.6	0.199	91	99	92
	Betamix	POST1	21-Jun	2.00 pts	0.33	25								
	Stinger	POST1	21-Jun	0.125 pts	0.047	7.5	41							
23	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	42	16.3	0.180	95	96	95
	Outlook	POST1	21-Jun	0.72 pts	0.54	13	22							
24	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	38	16.9	0.206	99	100	99
	Outlook	POST1	21-Jun	0.72 pts	0.54	13								
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38	60							
25	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	42	20.6	0.227	100	100	99
	Outlook	POST1	21-Jun	0.72 pts	0.54	13								
	Spinaid	POST1	21-Jun	2.00 pts	0.33	38								
	Stinger	POST1	21-Jun	0.250 pts	0.09	15	75							
26	Outlook	POST1	21-Jun	0.72 pts	0.54	13		4	28	7.4	0.115	13	41	18
	Stinger	POST1	21-Jun	0.25 pts	0.09	15								
	Upbeet	POST1	21-Jun	0.50 oz	0.031	30	58							
27	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	40	17.6	0.215	95	95	94
	Upbeet	POST1	21-Jun	0.50 oz	0.031	30	39							
	COC			1%										
28	Dual Mag	PPS	3-Jun	0.67 pts	0.64	9		4	39	18.7	0.224	99	100	99
	Upbeet	POST1	21-Jun	1.00 oz	0.063	60	69							
	COC			1%										
29	Unweeded							4	13	2.7	0.088	0	0	0
30	Weeded							4	35	14.0	0.182	74	93	60
	FPLSD (0.05)								13	6.1	0.06	21	25	19

Table 3. Site characteristics and herbicide application data for Dayton site, 2005.

Site characteristics

Plot size/exp. design	10 x 30	RCBD	
Proceeding crop	sweet corn		
Soil test	Ph	OM	CEC
	5.2	5.2%	14.7

Herbicide application data

Date	May 31, 2005	June 3, 2005	June 21, 2005	June 28, 2005
Crop stage			2-leaf	4-leaf
Weeds			see notes below[1]	
Herbicide/treatment	Roneet		all POST1	POST 3 11,12,13
Application timing	PPI	PPS	POST1	POST2
Start/end time	11:30-12:30	2-5 PM	8:00 - 11:00	12-12:15
Air temp/soil temp (2")/surface	63/69/69	78/90/88	75.4 / 76.8 / 81	75/75/78
Reel humidity	98%	55%	80%	80%
Wind direction/velocity	0-2 se	0-2 all directions	2-3 W	01- SW
Cloud cover	100/raining	0	100	100
Soil moisture	damp to wet	Damp to wet	Damp	damp and sticky
Plant moisture			Dry	very wet from rain
Sprayer/PSI	40	35	40	40
Mix size	3 gal	3 gal for single Dual Magnum treatments; 2100 ml for Dual PPS tankmixes and Pyramin	2100 ml	2100
Gallons H20/acre	20	20	20	20
Nozzle type	8002	8002	8002	8002
Nozzle spacing and height	20/18	20/18	20/18	20/18
Soil inc. method/implement	2x harrow disk spring tooth disk	irrigated in immediately after application	rain or irrigation possible	

[1]Pigweed	2-3 leaf, 2 inch diameter
Black and hairy nightshade	2 leaf, 1 inch
Groundsel	2 leaf, 1 inch
Dog fennel	2 leaf, 1 inch
Barnyardgrass	1 leaf/ 1/2 inch diameter

Table 4. Table beet tolerance to Dual Magnum herbicide, Corvallis, 2005.

	Herbicide	Timing	Rate		Obs.	4 WAP			Harvest			
						Emer-gence	Phyto-toxicity	Stunting	No. roots harvested	Yield	Grade	
											No. 1	No. 2
			pts	*lbs ai/A*		*no/ 5 ft*			*/10 ft. of row*	*t/A*	*%*	
1	Dual Magnum	PPS	0.67	0.64	4	20	0	5	47	15.4	15	61
2	Dual Magnum	PPS	1.0	0.95	4	18	0	10	51	14.9	19	61
3	Dual Magnum	PPS	1.33	1.27	4	21	0	15	47	20.8	6	54
4	Check (weeded)				4	20	0	0	53	22.0	8	60
5	Check (unweeded)				4	20	0	0	56	12.9	19	63
	FPLSD					*ns*	*ns*	*8*	*ns*	*5.9*	*ns*	*ns*

Table 5. Site characteristics and herbicide application data for Corvallis, 2005.

Site characteristics			
Plot size/exp. design	10*30	4 reps	RCBD
Proceeding crop	Sweet corn		
Soil test	pH 6.0	OM 5.1 %	CEC 20.5
Herbicide application data			
Date	June 14, 2005	June 15, 2005	June 17, 2005
Herbicide/treatment	Roneet	Dual Magnum	Pyramin
Application timing	PPI	PPS	PPS
Start/end time	4:30 PM	6:30-7:30	10-10:30 AM
Air temp/soil temp (2")/surface	65/ /	52/55/54	75/81/85
Rel. humidity	75%	85%	78%
Wind direction/velocity	3-6 W	0	1-4 E
Cloud cover	0	Clear	50%
Soil moisture	dry	soil dry	Damp
Sprayer/PSI	Tractor	BP 40PSI	BP 40PSI
Mix size	30 Gal	2100	3 gal
Gallons H20/acre	30	20	20
Nozzle type	8002	8002	8002
Nozzle spacing and height	Rotera within 15 minutes	20/18	20/18
Soil inc. method/implement		Irrigation	Irrigation

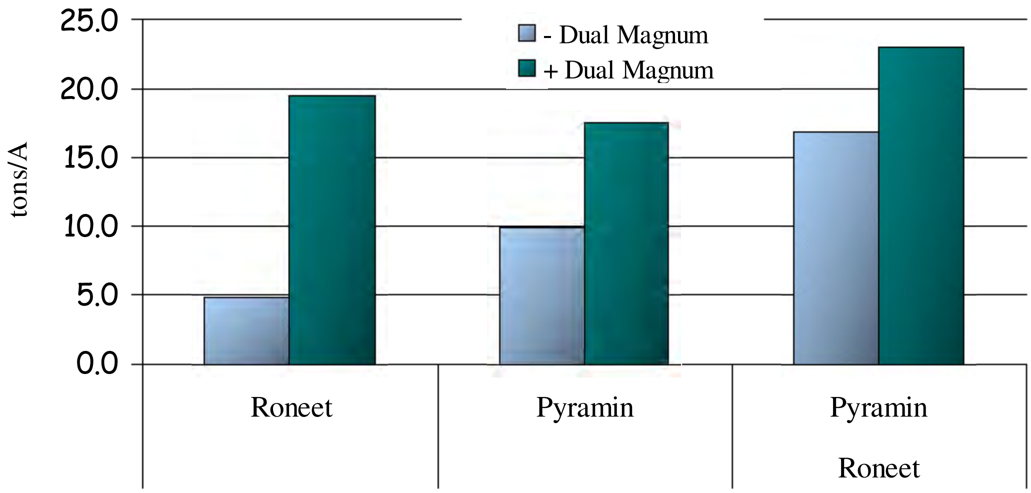

Figure 1. Roneet (4 pts/A), Pyramin (4 lbs/A), and Dual Magnum (0.66 pts/A) effects on yield of table beets, Dayton, OR, 2005.

Field Evaluation of Herbicides in Garden Beets

Ed Peachey, Horticulture Department, Oregon State University, Corvallis, OR

The objective of this research was to collect efficacy and crop safety data to support herbicide registrations in specialty crops.

Methods

Table beets were planted at adjacent sites on May 26, 2005 following soil tillage and fertilizer application. Herbicides were applied with a CO_2 pressured back pack sprayer at 20 GPA and 30-40 PSI depending on weather conditions. The sprayer was calibrated with the standard procedure of measuring output per nozzle and adjusting walking speed to apply the appropriate volume per plot. Walking speed was regulated by a metronome and time/plot validated with a stop watch.

Stand counts were made 4 WAP, after the last herbicide was applied. Crop response and weed control were recorded at 12 WAP in beets. Beets were harvested from 5 feet of one row in each plot on August 19 (12 WAP). Data were analyzed with ANOVA for a randomized complete block and means separated with Fisher's Protected LSD.

Results and Discussion

Significant stunting of beets was observed at 4 WAP (Table 1) by the herbicides Define (PES and EPOST), Everest (PES and EPOST), KIH-485 (PES and EPOST), Prowl (PES), GF-443 (PES and EPOST), and Upbeet (EPOST, after 1st of 2 applications). At 8 WAP (Table 2), the same herbicides listed above continued to reduce crop growth, along with Dual Magnum (EPOST), Outlook (EPOST) and Prowl (EPOST). Treatments of Prowl (PES and EPOST), V10142 (PES and EPOST), GF-443 (PES and EPOST), and Everest (EPOST) produced no yield (Table 3). Of the herbicides evaluated, only Dual Magnum (PES), Outlook (PES), and Betamix (EPOST) did not significantly reduce yield. Dual Magnum treatments yielded poorly because of weed competition late in the season, but provided surprisingly good control of hairy nightshade early in the season. Betamix applied at the 2-leaf stage in beets was the most effective herbicide in this trial. Spinaid is currently labeled in beets, but can only be applied to beets with 4-leaves, and as demonstrated in this experiment, provided very poor control even when applied at the 2-leaf stage. Weed density at this site was extreme with large populations of hairy nightshade, lambsquarters, and smartweed. Because of the high weed density, hand weeding of the check plots significantly reduced beet yield.

Table 1. Table beet tolerance to herbicides, first evaluation, Corvallis, 2005.

	Herbicide	Timing	Growth stage	Date	Rate	Obs.	Plant stand	Evaluation 1 (24-Jun)					
							21-Jun	Phyto	Stunting	Weed control			
										Hairy nightshade	Lambs-quarters	Smartweed	Avg.
					lbs ai/A		no/3 ft	0-10	%	--------------------%-----------------			
1	Define	PES			0.60	4	17	1	38	20	5	38	23
2	Dual Magnum	PES			0.66	4	33	0	0	63	15	40	61
3	Everest	PES			0.03	4	22	8	93	33	49	95	50
4	KIH-485	PES			0.09	4	24	5	75	92	73	25	88
5	Nortron	PES			1.00	4	37	0	10	70	5	57	55
6	Outlook	PES			0.55	4	35	1	18	94	75	97	91
7	Prowl H2O	PES			1.00	4	25	7	93	96	96	95	95
8	GWN 3040	PES			1.50	4	31	0	8	5	0	0	5
9	V10142	PES			0.10	4	7	-	100	20	85	75	45
10	GF-443	PES			0.022	4	8	-	100	100	100	92	99
11	Define	EPOST	2- leaf	18-Jun	0.40	4	31	4	33	25	28	20	24
12	Dual Magnum	EPOST	2- leaf	18-Jun	0.66	4	27	0	0	0	0	0	0
13	Everest+NIS 0.25%	EPOST	2- leaf	18-Jun	0.26	4	27	8	48	63	30	25	40
14	KIH-485	EPOST	2- leaf	18-Jun	0.094	4	46	3	38	8	0	0	10
15	Nortron	EPOST	2- leaf	18-Jun	1.00	4	34	0	0	28	23	3	20
16	Outlook	EPOST	2- leaf	18-Jun	0.98	4	34	1	18	8	5	0	10
17	Prowl H2O	EPOST	2- leaf	18-Jun	1.00	4	35	2	18	50	5	0	28
18	GWN 3040	EPOST	2- leaf	18-Jun	1.50	4	31	0	13	0	8	0	3
19	V10142	EPOST	2- leaf	18-Jun	0.10	4	24	8	50	0	0	0	0
20	UpBeet+COC 1 %	EPOST	2-leaf	18-Jun	0.016	4	33	4	28	50	5	15	33
	UpBeet+COC 1 %	POST	4-leaf	26-Jun	0.016								
21	GF-443+MSO 1%	EPOST	2- leaf	18-Jun	0.066	4	28	8	50	73	68	65	65
22	Betamix	VEPOST	Coty	12-Jun	0.4	4	35	0	0	94	100	40	93
23	Betamix	EPOST	2- leaf	18-Jun	0.4	4	38	1	3	93	93	78	88
24	Spinaid	VEPOST	Coty	12-Jun	0.4	4	25	0	0	89	91	50	86
25	Spinaid	EPOST	2- leaf	18-Jun	0.4	4	25	0	0	65	70	8	53
26	Untreated					4	46	0	0	0	0	0	0
27	Handweeded					4	34	0	0	-	-	-	-
	FPLSD (0.05)						16	2.2	18	24	31	41	20

Table 2. Table beet tolerance to herbicides, **second evaluation**, Corvallis, 2005.

	Herbicide	Timing	Growth stage	Date	Rate	Obs.	Evaluation 2 (21-Jul)						
							Phyto	Stunting	Weed control				
									Pigweed	Hairy nightshade	Lambs-quarters	Smartweed	Average
					lbs ai/A		0-10	%	---------------------------%-----------------------				
1	Define	PES			0.60	4	0	38	100	0	36	71	13
2	Dual Magnum	PES			0.66	4	0	8	100	56	38	76	59
3	Everest	PES			0.03	4	0	83	100	0	43	100	21
4	KIH-485	PES			0.09	4	0	35	100	78	53	51	70
5	Nortron	PES			1.00	4	0	18	100	49	24	71	31
6	Outlook	PES			0.55	4	0	3	100	89	66	81	84
7	Prowl H2O	PES			1.00	4	-	100	95	88	100	99	95
8	GWN 3040	PES			1.50	4	0	20	31	15	23	67	25
9	V10142	PES			0.10	4	-	100	100	0	92	94	14
10	GF-443	PES			0.022	4	-	100	100	99	99	74	92
11	Define	EPOST	2- leaf	18-Jun	0.40	4	0	34	95	8	23	40	20
12	Dual Magnum	EPOST	2- leaf	18-Jun	0.66	4	0	29	49	0	40	45	15
13	Everest+NIS 0.25%	EPOST	2- leaf	18-Jun	0.26	4	0	98	100	82	0	100	38
14	KIH-485	EPOST	2- leaf	18-Jun	0.094	4	0	33	60	35	23	8	21
15	Nortron	EPOST	2- leaf	18-Jun	1.00	4	0	15	98	61	51	61	41
16	Outlook	EPOST	2- leaf	18-Jun	0.98	4	0	33	81	33	35	53	40
17	Prowl H2O	EPOST	2- leaf	18-Jun	1.00	4	2	80	85	55	55	33	60
18	GWN 3040	EPOST	2- leaf	18-Jun	1.50	4	0	40	25	8	30	84	24
19	V10142	EPOST	2- leaf	18-Jun	0.10	4	0	79	85	0	25	43	8
20	UpBeet+COC 1 %	EPOST	2-leaf	18-Jun	0.016	4	0	25	60	55	0	88	26
	UpBeet+COC 1 %	POST	4-leaf	26-Jun	0.016								
21	GF-443+MSO 1%	EPOST	2- leaf	18-Jun	0.066	4	-	100	100	100	96	72	89
22	Betamix	VEPOST	Coty	12-Jun	0.4	4	0	0	100	91	95	50	80
23	Betamix	EPOST	2- leaf	18-Jun	0.4	4	0	0	85	84	81	59	84
24	Spinaid	VEPOST	Coty	12-Jun	0.4	4	0	10	25	83	76	53	60
25	Spinaid	EPOST	2- leaf	18-Jun	0.4	4	0	19	24	50	79	23	30
26	Untreated					4	0	36	0	0	0	0	0
27	Handweeded					4	0	5	-	-	-	-	-
	FPLSD (0.05)						0.8	23	39	27	43	50	29

Table 3. Table beet yield response to herbicides, Corvallis, 2005.

	Herbicide	Timing	Growth stage	Date	Rate	Obs.	Crop Yield			
							No.	Yield	Avg. root wt.	Weed control
					lbs ai/A		no./5 ft of row	t/A	Lbs	%
1	Define	PES			0.60	4	9	1.6	0.06	25
2	Dual Magnum	PES			0.66	4	26	11.4	0.15	54
3	Everest	PES			0.03	4	0	0.3	0.08	0
4	KIH-485	PES			0.09	4	6	3.9	0.19	59
5	Nortron	PES			1.00	4	19	7.3	0.12	25
6	Outlook	PES			0.55	4	30	17.4	0.21	81
7	Prowl H2O	PES			1.00	4	0	0	0	70
8	GWN 3040	PES			1.50	4	18	5.1	0.10	40
9	V10142	PES			0.10	4	0	0	0	8
10	GF-443	PES			0.022	4	0	0	0	91
11	Define	EPOST	2- leaf	18-Jun	0.40	4	7	1.9	0.11	28
12	Dual Magnum	EPOST	2- leaf	18-Jun	0.66	4	8	3.0	0.10	20
13	Everest+NIS 0.25%	EPOST	2- leaf	18-Jun	0.26	4	0	0	0	23
14	KIH-485	EPOST	2- leaf	18-Jun	0.094	4	10	3.4	0.10	35
15	Nortron	EPOST	2- leaf	18-Jun	1.00	4	16	6.1	0.11	21
16	Outlook	EPOST	2- leaf	18-Jun	0.98	4	15	4.6	0.11	35
17	Prowl H2O	EPOST	2- leaf	18-Jun	1.00	4	3	0.8	0.07	30
18	GWN 3040	EPOST	2- leaf	18-Jun	1.50	4	9	3.4	0.12	25
19	V10142	EPOST	2- leaf	18-Jun	0.10	4	0	0	0	5
20	UpBeet+COC 1 % UpBeet+COC 1 %	EPOST POST	2-leaf 4-leaf	18-Jun 26-Jun	0.016 0.016	4	15	5.2	0.14	28
21	GF-443+MSO 1%	EPOST	2- leaf	18-Jun	0.066	4	0	0	0	78
22	Betamix	VEPOST	Coty	12-Jun	0.4	4	35	13.6	0.13	68
23	Betamix	EPOST	2- leaf	18-Jun	0.4	4	32	17.1	0.18	71
24	Spinaid	VEPOST	Coty	12-Jun	0.4	4	21	9.0	0.16	28
25	Spinaid	EPOST	2- leaf	18-Jun	0.4	4	11	2.9	0.07	5
26	Untreated					4	7	2.2	0.09	0
27	Hand-weeded					4	25	10.0	0.14	70
	FPLSD (0.05)						10	4.4	0.10	29

Brassica Tolerance to Outlook (dimethenamid-P) and Dual Magnum (S-metolachlor)

Ed Peachey, Horticulture Department, OSU

Materials and Methods

The experiment was located at the Vegetable Research Farm near Corvallis on a silt loam soil in Area 15 S. The pH was 5.2, OM 2.5%, and CEC 22.3 meq/100 g soil. The experimental design was a split plot with crop as the main plot, and herbicide treatments randomized within main plots. All treatments were replicated 4 times.

Fertilizer (600 lbs/A 12-29-10) was broadcast on May 10, followed by Treflan (0.75 lbs ai/A). The fertilizer and Treflan were shallow incorporated with a Rotera. Broccoli (var. Southern Comet) and Chinese cabbage (var. Blues) were planted at 3 seeds/row ft on 18 inch rows with 4 rows per bed. An additional 200 lbs of 12-29-10 fertilizer/A was banded between rows during planting.

PES treatments were applied on May 12, and Devrinol and Lorsban applied on May 13 to suppress weed emergence and reduce the potential of cabbage maggot damage. Outlook and Dual Magnum were applied at cost equivalent rates. Irrigation was applied shortly thereafter at about ½ inch. Rainfall kept the soil moist for the next 2-3 weeks, including ¾ inch between May 31 and June 4.

EPOST treatments were applied to 1-1.5 lf broccoli and 2-3 lf Chinese cabbage. POST treatments (Goal Tender) were applied to 3-4 lf crucifers.

Emergence was counted and weeds ratings taken on May 25 and 29, respectively, followed by cultivation and hand hoeing to remove weeds. Fertilizer urea (100 lbs N/A) was side-dressed. Chinese cabbage was harvested one time on July 14 from 2- 8 ft rows, and broccoli was harvested from 2-10 ft lengths of row on July 21 and 24.

Results and Discussion

The predominant weed present was shepherdspurse with a few hairy nightshade intermingled. Treflan and Devrinol reduced weed density sufficiently to reduce the impact of weeds on crop yield.

The only herbicide that reduced emergence of both brassica species was GF-443. Stunting from the herbicides was greater for Outlook than Dual Magnum, and stunting tended to be greater on Chinese cabbage than broccoli for both herbicides. Outlook caused more injury symptoms than Dual Magnum at the tested rates. Dual Magnum EPOST caused less injury to broccoli than Outlook EPOST. Misapplication voided the results from treatments 5 and 10.

Crop yields were generally greater with Dual Magnum than Outlook at economically comparable rates. Even though Dual Magnum stunted early season growth of Chinese cabbage, the crop went on to yield greater than or equal to the check in some cases.

Results in 2005 indicated that broccoli was more tolerant to Outlook than Chinese cabbage, and this was verified in this experiment. When averaged across treatments 1 to 4 and 7-10 of the two chloroacetamide herbicides, stunting was greater for Chinese cabbage than broccoli (48% vs. 33% stunting for the 1st evaluation and 48% vs. 36% at the 2nd evaluation; P=0.01 and 0.05 respectively). However, the damage caused by Outlook to Chinese cabbage in this experiment was much less than in 2005. The difference between the two years is unclear, but possibly related to the above average rainfall during the four weeks after planting in 2006.

Broccoli and Chinese cabbage were tolerant to Goal Tender POST at up to 0.125 lbs ai/A. Spartan 4F at 0.10 lbs ai/A provided the greatest broccoli yield of 7.6 t/A with very good weed control. Tankmixes of Dual or Outlook with Spartan suppressed broccoli yield. KIH-485 exhibited good weed control but stunted early season growth and reduced yield.

Table 1. Broccoli and Chinese cabbage tolerance to Outlook and Dual Magnum herbicides, 2006, Corvallis, OR.

	Herbicide	Timing	Rate	Obs	Broccoli								Chinese cabbage								Weeds
					Emergence (no./10 ft)	Stunting (%, 6/5)	Stunting (%, 6/21)	Phyto (0-10, 6/5)	Phyto (0-10, 6/21)	No. heads harvested (no./20 ft of row)	Yield (t/A)	Avg. head wt. (lbs)	Emergence (no./10 ft)	Stunting (%, 6/5)	Stunting (%, 6/21)	Phyto (0-10, 6/5)	Phyto (0-10, 6/21)	No. heads harvested (no./16 ft of row)	Yield (t/A)	Avg. head wt. (lbs)	Percent control
1	Outlook	PES	0.375	4	13	38	38	1.0	0.5	6	2.9	0.75	15	40	38	1.3	1.0	12	47.2	4.66	96
2	Outlook	PES	0.75	4	10	50	58	1.3	0.0	3	0.9	0.51	11	70	68	2.8	1.0	10	36.5	4.14	98
3	Outlook	VEPOST	0.75	4	13	20	33	2.0	0.5	7	3.7	0.73	15	48	55	4.0	1.0	9	34.2	4.40	76
4	Outlook	VEPOST	1.5	4	19	33	28	2.0	1.0	8	4.3	0.73	18	48	48	5.0	2.3	10	43.9	4.98	91
5	Outlook	PES VEPOST	0.375 0.75	 4																	
6	Outlook	PES VEPOST	0.75 1.5	4 4	10	79	58	2.3	0.3	2	0.9	0.66	11	91	88	5.0	3.0	4	12.5	3.18	100
7	Dual Magnum	PES	0.63	4	15	14	20	0.3	0.8	11	5.8	0.75	17	30	23	1.0	0.3	12	53.2	5.30	78
8	Dual Magnum	PES	1.26	4	17	15	18	0.0	0.3	8	5.5	0.95	15	28	28	1.0	0.5	10	47.2	5.95	94
9	Dual Magnum	VEPOST	1.26	4	14	35	28	1.0	0.3	10	6.2	0.88	20	25	28	1.8	0.3	12	54.0	5.33	76
10	Dual Magnum	VEPOST	2.52	4																	
11	Dual Magnum	PES VEPOST	0.63 1.26	4 4	17	18	28	0.8	0.3	7	3.8	0.88	19	38	35	2.5	0.5	12	56.1	5.46	97
12	Dual Magnum	PES VEPOST	1.26 2.52	4 4	17	33	55	1.3	0.5	6	2.9	0.59	11	65	68	4.0	0.8	9	29.1	3.87	98
13	Goal Tender	POST	0.0625	4	17	10	5	0.3	0.8	10	5.9	0.88	19	10	28	1.0	1.5	12	47.2	4.26	76
14	Goal Tender	POST	0.125	4	15	10	8	1.0	1.0	11	6.3	0.77	16	5	43	1.3	3.8	11	44.3	4.38	83
15	Goal Tender	POST	0.1875	4	15	3	13	0.3	2.0	8	4.7	0.77	17	8	45	0.5	3.3	11	34.5	3.69	86
16	Goal Tender	POST	0.25	4	17	5	25	0.5	3.3	8	4.1	0.70	18	15	55	0.0	5.8	10	37.0	4.22	79

Table 1, cont'd

	Herbicide	Timing	Rate	Obs	Broccoli								Chinese cabbage								Weeds
					Emergence (no./10 ft)	Stunting (%, 6/5)	Stunting (%, 6/21)	Phyto (0-10, 6/5)	Phyto (0-10, 6/21)	No. heads harvested (no./20 ft of row)	Yield (t/A)	Avg. head wt. (lbs)	Emergence (no./10 ft)	Stunting (%, 6/5)	Stunting (%, 6/21)	Phyto (0-10, 6/5)	Phyto (0-10, 6/21)	No. heads harvested (no./16 ft of row)	Yield (t/A)	Avg. head wt. (lbs)	Percent control
17	Spartan 4F	PES	0.10	4	16	10	15	0.5	0.5	13	7.6	0.84	14	18	13	0.0	0.5	10	37.8	4.91	97
18	Spartan 4F	PES	0.15	4	13	20	25	1.0	0.0	9	5.3	0.79	15	28	25	0.3	0.0	13	50.9	4.83	98
19	Spartan 4F	POST	0.10	4	16	5	13	0.3	1.0	11	6.8	0.81	19	3	33	0.5	4.0	12	43.9	4.08	74
20	KIH-485	PES	0.067	4	13	18	20	0.8	0.3	8	5.0	0.88	18	38	28	1.3	0.5	10	47.4	5.32	96
21	GF-433	PES	0.022	4	10	98	98	-	-	0	0.1	0.66	4	100	100	-	-	0	0.0	0.00	100
22	Check	-	-	4	18	0	0	0.3	0.3	11	6.7	0.84	18	10	3	0.0	0.0	13	51.6	4.57	0
23	Dual Spartan 4F	PES PES	0.63 0.10	4	15	25	23	0.5	0.8	9	5.5	0.88	12	13	25	0.5	0.3	11	44.6	4.67	100
24	Outlook Spartan 4F	PES PES	0.375 0.10	4	15	33	33	0.8	1.3	10	5.1	0.70	13	38	35	0.3	0.0	10	45.7	5.36	97
25	Weed-free	-	-	4	17	8	5	0.8	0.0	11	7.5	0.95	19	13	8	0.5	0.0	12	50.0	4.78	89
26	Check	-	-	4	16	3	0	0.3	0.0	10	6.0	0.84	14	10	13	1.0	0.0	14	38.5	2.17	0
LSD					4	21	21	1.1	2.0	4	2.6	0.26	4	20	22	2.0	1.5	4	18.3	NS	14

Table 2. Herbicide application data.

Date	May 12, 2006	May 29, 2006	June 08, 2006
Application timing	PES	VEPOST	POST
Crop stage	-	Broccoli 1-1.5 lf, Ch. cab 2-3 lf	3-4 leaf
Weeds and growth stage			
Shepherdspurse	-	-	2-6 lv
Nightshade	-	-	2-10 lvs, some 4 inches tall
Start/end time	6-8:30	6-7:30 AM	8:15-9:15 AM
Air temp/soil temp (2")/surface	58.3/60.4/73.2	60/64/60	62.2/66.4/71.2
Rel humidity	84%	90%	79%
Wind direction/velocity	0	SW 0	E 0-1
Cloud cover	10%	100	60%
Soil moisture	Dry	Very wet	Dry
Plant moisture	-	Wet	Dry
Sprayer/PSI	BP 40 PSI	BP 40 PSI	BP 40 PSI
Mix size (mls)	2100	2100	2100
Gallons H_20/acre	20	20	20
Nozzle type	8002	8003	8003
Nozzle spacing and height	20/20	20/20	20/20
Soil inc. method/implement	irrigation on 5-13	rain shower possible	-

Radish Seed Crop Tolerance to Outlook and Dual Magnum Herbicides

Ed Peachey, Horticulture Dept., OSU

Dual Magnum is currently registered for use in radish seed crops. Use directions specify a preplant incorporated application of 1.0 to 1.33 pints (0.95 to 1.27 lbs. ai S-metolachlor) per acre prior to seeding. The tolerance of transplanted radish seedlings to Dual Magnum has not been determined. The preferred method of application in transplanted radish would be to apply after the radish seedlings are transplanted. Therefore, the objective of this research was to test crop tolerance to Dual Magnum when applied after the seedlings were transplanted. The experiment also compared radish transplant tolerance to Outlook herbicide. Outlook herbicide has chemistry similar to Dual Magnum, but is more effective on nightshade species than Dual Magnum.

Methods

Herbicides were applied on April 28, 2006, one day after transplanting radish seedlings that had 6 to 7 true leaves. Dual Magnum and Outlook were applied at cost equivalent rates. The herbicides were applied broadcast with 20 GPA water at 30 psi with 8002 flat fan nozzles held at approx. 24 inches above the soil. Plots were wide enough (12 ft) to encompass both male and female rows and were 25 ft long. There were three replications of each treatment arranged in a randomized complete block design. Irrigation was applied within 2 days of herbicide application. The soil and air temperatures at application were 90 and 75 F, respectively, and relative humidity was 66%.

Table. Treatments applied to radish transplants with 6-7 leaves.

	Herbicide	Rate	
		oz/A	*lbs ai/A*
1	Dual Magnum	16.0	0.95
2	Dual Magnum	32.0	1.90
3	Outlook	11.9	0.55
4	Outlook	23.7	1.11
5	Check	-	-

Results and Discussion

There were no visually discernible effects of Dual Magnum or Outlook herbicide on radish plant growth at evaluations 2, 4, and 8 weeks after transplanting. There was a slight suppression in growth in some of the plots noted at the first evaluation, but this was likely related to location of the affected plots rather than herbicide treatment. The experiment spanned a small swale, and growth within the swale tended to be less than in plots outside the swale. An extended wet period from May 15 to June 10 may have exacerbated the reduction in growth in affected plots. A few plants within the field appeared to die prematurely, before seed maturity, but statistical analysis again indicated that the effect was caused more by proximity to the low point in the field rather than treatment ($P = 0.04$ for relative position to the swale vs. $P = 0.57$ for treatment effect).

CARROTS AND PARSNIPS

Tolerance of Carrots and Parsnips to Dual Magnum and Outlook Herbicides

Ed Peachey OSU Horticulture Dept., Corvallis and Bob McReynolds, NWREC, Aurora

Introduction

The objective of the study was to compare crop tolerance of carrots and parsnips to two soil and early postemergent herbicides, Dual Magnum and Outlook. Dual Magnum (s-metolachlor) was recently registered for use on root crops, but provides poor control of hairy nightshade, and looses effectiveness if rainfall is excessive after application.

Methods

Two rows of carrots and two rows of parsnips were planted on May 1, 2006 in 6 ft beds with 18 inches between rows. Dual Magnum and Outlook (dimethenamid-p) herbicide rates for similar treatments (PES, EPOST, or PES + EPOST) were based on equivalent herbicide costs/acre. Herbicides were applied to 6 ft by 30 ft plots with each treatment replicated 4 times in a RCBD. Linuron (0.5 lbs ai/A) was applied EPOST on May 31, 2006 after the initial weed ratings to reduce weed competition with the crop, and plots were kept weed free thereafter with cultivation and hand hoeing. Carrots and parsnips were harvested on August 8, 2006 from 10 ft of the middle row of each plot. Weeds present included pigweed, lambsquarters, and common purslane.

Results & Discussion

Carrots were much more tolerant than parsnips to both herbicides. Both carrots and parsnips suffered less injury from Dual Magnum than Outlook. Weed control was better with Outlook than Dual Magnum at cost-equivalent rates. Outlook caused unacceptable yield reductions in both carrots and parsnips. The split application of Dual Magnum (PES + EPOST) may have improved weed control slightly compared to PES only, but carrot yield was substantially reduced at the 2X rate (Tr. 6).

Table 1. Effect of Dual Magnum and Outlook on parsnip and carrot growth, yield and weed control, Corvallis, OR, 2006.

	Herbicide	Timing	Rate	Crop stand (10 DA[1] EPOST)		Phytotoxicity (1 WA[1] EPOST)		Stunting (1 WA EPOST)		Weed control	Crop yield			
											Parsnip		Carrot	
				Parsnip	Carrot	Parsnip	Carrot	Parsnip	Carrot		Roots	Wt.	Roots	Wt.
			lb ai/A	*% of check*		*----- 0-10 -----*		*----- 0-100 % ----*		*%*	*#/10 ft of row*	*t/A*	*#/10 ft of row*	*t/A*
1	DualMag	PES	0.64	58	103	0.5	0.0	18	20	79	37	2.8	79	12.9
2	DualMag	PES	1.28	58	102	1.0	0.0	43	30	83	38	2.8	73	11.1
3	DualMag	EPOST	1.28	79	104	1.3	0.3	13	18	13	46	3.2	65	11.4
4	DualMag	EPOST	2.56	97	78	3.5	1.3	36	40	25	17	0.6	61	7.7
5	DualMag	PES + EPOST	0.64 1.28	56	89	0.5	0.0	33	35	88	33	1.7	69	10.4
6	DualMag	PES + EPOST	1.28 2.56	33	69	1.8	1.5	60	40	89	15	0.5	60	6.2
7	Outlook	PES	0.38	55	50	0.5	0.0	43	73	95	40	3.2	34	3.9
8	Outlook	PES	0.75	14	13	0.5	0.7	88	89	98	6	0.7	10	1.5
9	Outlook	EPOST	0.75	62	101	1.5	0.8	8	29	13	37	1.8	64	5.0
10	Outlook	EPOST	1.5	101	82	1.8	0.0	15	33	20	32	1.3	41	3.3
11	Outlook	PES + EPOST	0.375 0.75	47	64	1.3	0.3	55	67	94	25	1.1	33	2.1
12	Outlook	PES + EPOST	0.75 1.5	5 0	5 0	-	-	93	98	100	0	0	0.5	0.1
15	Linuron	POST	0.5	100	100	0	0	0	0	18	61	4.6	68	12.1
16	Hand weeded + linuron			78	102	0	0	8	10	50	63	4.8	77	14.5
LSD (0.05)				22	27	0.9	0.9	21	22	38	13	0.9	19	2.5

[1] DA, days after; WA, weeks after.

Table 2. Herbicide application and soil data.

Application date	May 2	May 29
Application timing	Preemergence surface (PES)	Early postemergence (EPOST)
Crop stage	Planted May 1; 3/4 inch deep	Carrots and parsnips 1.5 - 2 leaf
Start/end time	6-7 AM	8-9:30 AM
Air temp/ soil surface	45/50^{0}F	60/67^{0}F
Relative humidity	85%	90%
Wind direction/velocity	N 1-3	SW 0-1
Cloud cover	0	80
Soil moisture	Dry	Very wet
Plant moisture	-	Wet
Sprayer/PSI	Backpack, 4-8002 nozzles, 30 PSI, 20 GPA	Backpack, 4-8002 nozzles, 30 PSI, 20 GPA
Soil inc. method/implement	Irrigation of 0.5 in	Rainfall on May 31, 2 days after application
Soil texture	Silt loam	
Soil pH	5.2	
CEC	29.3 meq/100g soil	
OM	3.5%	

Seed Carrot Tolerance to Pendimethalin and Mesotrione Broadcast at Layby

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Abstract

The objective of this trial was to determine carrot tolerance to pendimethalin and mesotrione applied as an over-the-top broadcast treatment at layby. A single trial was conducted in a commercial hybrid carrot field in the female rows near Culver. Mesotrione caused severe carrot injury (Table 1). Pendimethalin injury was not visible at evaluations made 8 and 29 days after application. An unusual growth form was observed 16 days after application in the pendimethalin plots, but it is unclear if this was the result of herbicide injury.

Introduction

Pendimethalin (Prowl) is currently registered for use in carrot seed as directed spray at layby. This application technique requires specialized spray equipment. Pendimethalin would be more useful as an over-the-top broadcast treatment at layby, however it is unknown if this type of application is safe. Mesotrione (Callisto) is a herbicide that has been reported to have some safety on carrots. The objective of this trial was to determine carrot tolerance to pendimethalin and mesotrione applied as an over-the-top broadcast treatment at layby.

Methods and Materials

A single trial was conducted in a commercial hybrid carrot field in the female rows near Culver. The carrots were Carota type and were steckling planted. Herbicide treatments were applied on June 15, 2006 to carrots that were 12 to 24 inches in height and beginning to flower. Plots were 10 ft by 25 ft with four replications arranged as randomized complete blocks. Treatments were applied with a CO_2 backpack sprayer delivering 20 gpa operating at 20 psi and 3 mph. Crop injury was determined by taking visual evaluations on a percentage scale.

Results and Discussion

Mesotrione caused severe injury to carrot foliage and stunted the plants (Table 1). Carrot injury from pendimethalin was not visible at evaluations made 8 and 29 days after application.

Some carrot injury was noted from pendimethalin at 16 days after application, but the symptoms were not typical for herbicide phytotoxicity. The peduncles (flower stem) of this type of carrot (Carota) had a tendency to fuse together. This phenomenon was evident in the checks, but it appeared to be more evident in the pendimethalin treated plots and was noted as injury. The visual evaluations did not reveal any relationship between pendimethalin rate and fused peduncles. At the final evaluation, the fused peduncles in pendimethalin treated plots were the same as in the checks. It is unclear whether the fused peduncles should truly be considered crop injury or an unusual characteristic that pendimethalin accentuated for a short period of time.

Table 1. Carrot injury following herbicide treatments applied on June 15 near Culver, Oregon, 2006.

		Carrot injury		
	Rate	June 23	July 1	July 14
Treatments	(lb ai/A)	(8 DAA)	(16 DAA)	(29 DAA)
		----------------------	%	----------------------
Pendimethalin	0.95	0	8	0
Pendimethalin	1.9	0	5	0
Pendimethalin	3.8	0	5	0
Mesotrione	0.25	41	70	48

PEPPERS

Bell Pepper Tolerance to Dual Magnum Herbicide

Ed Peachey, Horticulture Department, Oregon State University
Cooperators: Mike Christensen (Lebanon) and Peter Kenagy (Albany)

Introduction

Experiments were initiated in 2005 (Lebanon) and 2006 (Albany) to determine the potential of using Dual Magnum for weed control in bell peppers.

Methods

The growers applied Treflan prior to transplanting at both sites. The Dual Magnum treatments were applied 1-2 days before transplanting. Peppers were transplanted on 40 inch centers at Lebanon on June 3, 2005 and 30 inch centers at Albany on May 21, 2006. Crop injury was evaluated twice during the season. The Lebanon site was extremely weedy and was hoed several times and the row middles rototilled in late-July. The main weed at the Albany site was fennel that emerged from seed of the previous year's crop. Cultivations and hoeing by the grower kept weeds from interfering with the crop. Peppers were harvested from 20 row-ft at the Lebanon site, and 6 row-ft at the Albany site.

Results and Discussion

There was very little effect of Dual Magnum on bell pepper growth at the first two evaluations at both sites. Dual Magnum also provided moderate to good weed control at the Lebanon site, primarily black nightshade at 3 weeks after transplanting.

Crop yield at the two sites differed greatly because of differences in weather in the two years. In 2005, a long wet spell delayed planting until early June. Shortly after planting, temperatures increased and caused many transplants to die. Weed competition also was a factor at the Lebanon site as multiple hoeings were needed to control weeds, which likely reduced crop growth. The highest yield was with the 2 pt rate of Dual Magnum, probably because of reduced early season weed competition that also reduced hoeing and potential damage to the crop.

Crop yield at the Albany site was greater than the Lebanon site by more than three-fold. The peppers were transplanted in mid-May followed by an extended wet period. The growing season also was warmer than average and extended well into the fall. Coupled with very meager competition from the weeds present, the site produced exceptional yields. Again, yields were greatest with the 2 pt rate of Dual Magnum.

Table 1. Site characteristics and herbicide application data.

Site		Lebanon	Albany
Plot size/exp. Design		RCBD; 10 x 20; 4 reps	RCBD; 10 x 20; 4 reps
Proceeding crop		Grass seed	Fennel
Soil test	pH	6.3	5.3
	CEC	31.5	23.5
	OM	8.6	4.6
Herbicide application data			
Date		June 2, 2005	May 19, 2006
Crop stage		1 day before transplanting	1 day before transplanting
Application timing		PRETRANS	PRETRANS
Start/end time		12-12:30	8:00 AM
Air temp/soil temp (2")/surface		70/76/72	58/67/70
Rel humidity		70%	91%
Wind direction/velocity		2-4 N	<1 mph
Cloud cover		90	Clear
Soil moisture		Damp	Dry
Sprayer/PSI		BP/30	BP/35
Mix size		2100	2100
Gallons H20/acre		20	20
Nozzle type		6-8002 nozzles on 8.3 ft boom	6-8002 nozzles on 8.3 ft boom
Nozzle spacing and height		20/18	20/18
Soil inc. method/implement		Irrigation applied within 1 DAT	Irrigation applied within 1 DAT

Table 2. Effect of Dual Magnum on bell pepper yield near Lebanon in 2005 and in Albany in 2006.

Dual Magnum rate		Obs	Growth reduction rating		Phytotoxicity rating		Weed control	Fruit number	Yield	Avg. fruit wt.
	pts/A		------- % ------		------ 0-10 -----		*%*	*no/10 ft of row*	*t/A*	*Lbs*
2005			***25-Jun***	***12-Jul***	***25-Jun***	***12-Jul***	***25-Jun***			
1	1 pt	4	5	5	0	0	81	38	9.6	0.40
2	2 pt	4	13	5	0	0	93	48	11.4	0.36
3	Check	4	3	0	0	0	0	29	6.6	0.34
	FPLSD (0.050		*ns*	*ns*	*ns*	*ns*	*3.2*	*15*	*3.1*	*ns*
2006			***17-Jun***	***15-Jul***	***17-Jun***	***15-Jul***	-			
1	1 pt	4	0	0	0	0	-	52	31.4	0.45
2	2 pt	4	0	0	0	0	-	73	40.9	0.38
3	Check	4	0	0	0	0	-	66	35.1	0.35
	FPLSD (0.050		*ns*	*ns*	*ns*	*ns*		*ns*	*ns*	*ns*

SPINACH

Field Evaluation of Herbicides in Spinach

Ed Peachey, Horticulture Department, Oregon State University, Corvallis, OR

Introduction

The purpose of this research was to collect efficacy and crop safety data to support herbicide registrations in specialty crops.

Methods

Spinach was planted at adjacent sites on May 26, 2005 following soil tillage and fertilizer application. Herbicides were applied with a CO_2 pressured back pack sprayer at 20 GPA and 30-40 PSI depending on weather conditions. The sprayer was calibrated with the standard procedure of measuring output per nozzle and adjusting walking speed to apply the appropriate volume per plot. Walking speed was regulated by a metronome and time/plot validated with a stop watch.

Stand counts were made 4 WAP, after the last herbicide was applied. Crop response and weed control were recorded at 4 and 6 WAP in spinach. Spinach was harvested from 5 ft of two middle rows (total of 10 ft) on July 11, 6.5 WAP. Data were analyzed with ANOVA for a randomized complete block and means separated with Fisher's Protected LSD.

Results and Discussion

A number of the herbicides applied PES significantly reduced plant stand, including V10142, Outlook, Define, KIH-485, and GF-443. At 6 WAP, Prowl PES, VF10142 PES and POST, GF443 PES and POST, and Upbeet (POST) completely killed the crop. Four of the treatments did not cause injury or reduce yield significantly, and included Nortron PES, GWN 3040 PES and POST, and Define EPOST. However, weed control was poor with the herbicides Define and GWN 3040. Weed density was low at this site and did not provide an adequate test of these two herbicides. Nortron was the only herbicide that controlled weeds adequately without reducing yield.

Table 1. Schedule and herbicide application data for spinach crop, Corvallis, 2005

Site characteristics			
Plot size/exp. Design	10 x 20	4 reps	RCBD
Proceeding crop	Corn		
Soil test	pH	OM	CEC
	5.8	5.0 %	21.1 meq/100 g soil
Herbicide application data			
Date	May 28, 2005	June 12, 2005	June 17, 2005
Crop stage	Planted May 26	2-leaf, 2.4 WAP	4-leaf
Application timing	PES	EPOST	POST
Start/end time	9-11:00	7-8 AM	7:30-10:30
Air temp/soil temp (2")/surface	64/70/71	66/60/61	72/75/82
Rel humidity	70%	90%	76%
Wind direction/velocity	0-2	0-2 SWW	1-6 E to NE
Cloud cover	100	90	0-50%
Soil moisture	Dry	Dry	Damp
Plant moisture	-	Dry, rain threatening	Light rain at 6:30 AM
Sprayer/PSI	CO_2 Back pack at 40 PSI	CO_2 Back pack at 40 PSI	CO_2 Back pack at 30 PSI
Mix size	2100 ml	2100 ml	2100 ml
Gallons H20/acre	20 GPA	20 GPA	20 GPA
Nozzle type	8002	8002	8002
Nozzle spacing and height	20/18	20/18	20/18
Soil inc. method/implement	Irrigation 1 hr 0.4 "	Rain expected 6-13	Irrigation on 6-21

Table 2. Spinach tolerance to herbicides, Oregon State University, 2005.

Herbicide	Timing	Rate	Obs.	Emergence (4 WAP)	Phyto (4 WAP)	Stunting (4 WAP)	Weed control (4 WAP)	Phyto (6 WAP)	Stunting (6 WAP)	Weed control by species (6 WAP): Pig-weed	Night-shade	Purs-lane	Shepherds-purse	Barnyard-grass	Avg.	Harvest: Stand	Yield
		lbs ai/A		*no/10 ft*	*0-10*	*0-100*	*%*	*0-10*	*0-100*	----------------------------------%----------------------------------						*no./20 ft of row*	*t/A*
1 Define	PES	0.60	4	20	0.0	50	94	0.0	40	100	88	94	75	100	93	35	2.1
2 Dual Magnum	PES	0.66	4	25	0.0	30	74	0.0	43	100	96	98	100	100	95	46	3.3
3 Everest	PES	0.026	4	26	0.3	80	53	0.0	78	74	25	0	75	70	39	24	0.6
4 KIH-485	PES	0.094	4	20	0.5	45	96	0.5	43	100	98	100	99	100	99	37	3.1
5 Nortron	PES	1.0	4	28	0.0	5	85	0.0	5	100	94	100	57	100	84	44	5.2
6 Outlook	PES	0.55	4	16	1.0	50	99	0.0	43	100	100	100	100	100	99	26	2.6
7 Prowl H2O	PES	1.0	4	20	-	100	99	-	100	100	99	100	97	100	100	0	0
8 GWN 3040	PES	1.5	4	28	0.0	0	46	0.0	8	0	40	50	20	20	36	49	5.2
9 V10142	PES	0.10	4	13	8.0	98	80	0.0	99	100	15	100	100	50	58	1	0.1
10 GF-443	PES	0.022	4	10	-	100	100	-	100	100	100	100	100	100	100	1	0
11 Betamix	EPOST	0.40	4	28	1.8	50	96	0.0	43	94	88	95	100	81	86	47	2.4
12 Define	EPOST	0.40	4	29	1.5	23	61	0.0	20	73	59	59	73	85	55	47	4.5
13 Dual Magnum	EPOST	0.66	4	28	0.5	10	5	0.0	30	25	18	0	13	25	8	46	3.6
14 Everest NIS 0.025%	POST	0.26	4	27	4.3	38	55	-	100	99	99	93	100	70	84	4	0
15 KIH-485	POST	0.09	4	25	3.5	25	30	0.3	30	64	42	61	25	63	50	45	3.6
16 Nortron	POST	1.00	4	25	6.3	25	33	0.3	48	98	83	100	100	30	68	48	3.3
17 Outlook	POST	0.98	4	24	2.0	23	10	0.0	35	90	84	5	18	98	51	47	3.2
18 Prowl H2O	EPOST	1.00	4	29	5.5	53	49	1.0	60	93	74	100	66	63	83	46	1.9
19 GWN 3040	POST	1.50	4	27	0.5	15	5	0.0	15	59	35	98	0	70	43	47	4.3
20 V10142	POST	0.100	4	26	6.5	50	15	-	100	88	20	33	100	58	35	0	0
21 UpBeet	EPOST	0.016	4	29	8.5	86	86	-	100	96	100	28	100	64	60	0	0
(+ 1% COC)	POST	0.016															
22 GF-443 MSO 1% v/v	POST	0.066	4	26	7.5	50	86	-	100	100	100	96	100	85	96	0	0
23 Untreated			4	23	0.3	13	0	0.0	33	70	50	35	0	97	38	47	4.9
24 Hand weeded			4	27	0	0	-	0.3	13	-	-	-	-	-	-	46	4.3
FPLSD(0.05)				5	3.5	14	27	ns	24	36	39	33	26	46	32	9	1.8

Effect of Asulox on Weed Control in Spinach Grown for Seed

E. Peachey, Horticulture Department, OSU

Introduction

The effectiveness of Asulox for weed control in spinach grown for seed was evaluated at 2 locations in 2006. Asulox was applied at 1.5, 3, or 6 pts/A to 2 to 6-leaf spinach. Spinach was tolerant of Asulox when applied at 1.5 to 3 pts at the 2 to 6-lf stage. Weed control did not differ greatly between the 3 and 6 pt rates. Seed yield in plots treated with Asulox was comparable to the check plots at both sites. These results indicate that Asulox herbicide is suitable for weed control in spinach, but care may be needed when selecting adjuvants such as crop oil concentrate (COC) and nitrogen to apply with Asulox.

1. Weed control efficacy (North Howell)

Methods

Asulox herbicide was applied with 0.25% non-ionic surfactant (NIS)[a] to plots in a randomized complete block design when spinach was at the 6-8 leaf stage on June 19 (Table 1). Weed control was evaluated 2 weeks later, and the check plots were hoed at that point to reduce potential seed bank contamination. Twenty feet of row was harvested from each plot on August 8 after the crop had dried down. Plants were threshed by hand, run through a desktop cleaner (bottom screen was 6RD to match regular cleaning of contracted spinach seed), and then run through a South Dakota Seed Blower three times to remove chaff and light seed. Seeds were germinated at 15C on blotter paper and germination evaluated at 7 and 21 days.

Table 1. Herbicide application data for experiment at North Howell.

Application timing	POST, 6-8 lf spinach
Start/end time	1:30-2 PM
Air temp/soil temp (2")/surface	76/82/86
Rel humidity	80%
Wind direction/velocity	0-2 N
Cloud cover	0
Soil moisture	Very dry and compacted
Plant moisture	Dry
Sprayer/PSI	BP 40 PSI
Mix size	2100 mls
Gallons H20/acre	20
Nozzle type	6-8003
Nozzle spacing and height	20/18

Results and Discussion

There was no effect of Asulox herbicide on the spinach at 2 weeks after treatment (WAT). A slight reduction in growth in the check plot was noted because of weed competition. Asulox controlled shepherdspurse best, but also suppressed pigweed and the poppies (seedbank from a previous seed crop). Seed yield of the Asulox treatments did not differ significantly from the check plot.

[a] Preference nonionic surfactant and anti-foaming agent (Agrisolutions)

Table 2. Effect of Asulox herbicide on spinach growth and yield, and weed control, N. Howell.

Treatment	Rate	Obs.	Phyto.	Stunting	Weed Control (2 WAT)				Harvest (20 ft of row)			
					Pig-weed	Shepherds-purse	Poppies	Avg. weed	Plant number	Field dry-matter	Seed wt.	Weed control at harvest
	pts		*0-10*	*%*	-----------------------*% control*-------------					*kg*	*G*	*%*
1 Asulox[a]	3	4	0	0	78	95	90	84	48	2.7	654	30
2 Asulox	6	4	0	0	89	95	94	88	50	2.6	667	31
3 Check		4	0	5	-	-	-	-	50	2.4	694	0
FPLSD (0.05)			*ns*	*ns*	*8*	*4*	*6*	*3*	*ns*	*ns*	*ns*	*ns*

[a]NIS (*Preference* non-ionic surfactant) applied with Asulox at 0.25% v/v

2. Crop tolerance (Vegetable Research Farm, Corvallis)

Methods

Roneet herbicide was applied and incorporated along with 600 lbs 12-29-10 fertilizer on June 26 (Table 3). Later the same day, spinach was planted in 4 rows per bed with 18 in. between rows. Two rows were females and 2 rows were males. The spinach was thinned to 6 in. between each plant on July 13. EPOST herbicides were applied to 6.6 ft by 25 ft plots on July 14, and LPOST treatments applied on July 19. A non-ionic surfactant (NIS) at 0.25% was applied with treatments 1-4, and COC with treatments 5 and 6. Sevin insecticide was applied on July 19 to control cucumber beetle and leaf miner. Plots were hand hoed and cultivated several times during the season to reduce weed competition. Spinach plants were harvested from 10 ft of row, air dried initially, then at 110F for 48 hrs. Plants were threshed by hand, run through a desktop cleaner (bottom screen was 6RD to match regular cleaning of contracted spinach seed), and then run through a South Dakota Seed Blower three times to remove chaff and light seed.

Results and Discussion

Plant growth was uneven at this site possibly because of the late planting and extreme heat the plants experienced as they emerged during unseasonably hot weather in early July. At harvest, some of the female plants had senesced naturally but many remained vegetative.

Spinach tolerated Asulox when the herbicide was applied at the 2 to 4-leaf stage (Table 4), but the 6 pt rate of Asulox may have reduced spinach seed yield when it was applied at the 6-lf stage (Table 5). The yield data were highly variable, however, and statistical analysis indicated a low certainty that there were differences among treatments (P = 0.20). COC and the addition of urea ammonium nitrate (UAN) at 2.5% v/v may have increased crop injury.

Table 3. Herbicide application data, Vegetable Research Farm, Corvallis

Date	June 26, 2006	July 14	July 19
Crop stage	PPI	2-4 lf	4-8 lf
Weeds and growth stage			
Purslane	-	2" tall, 4"dia.	Hoed on 7-18
Pigweed	-	2"	
Herbicide/treatment	Roneet	1,2,5,6	3, 4
Application timing	PPI	EPOST	LPOST
Start/end time	8-8:30	2-2:30 PM	6:30-6:45 AM
Air temp/soil temp (2")/surface	-	86/96/104	53/64/64
Rel. humidity	80%	35%	85%
Dew point	-		51
Wind direction/velocity	-	0-2.5 W	0
Cloud cover	-	0	0
Soil moisture	-	Very dry	Dry
Plant moisture	-	Dry	Light dew
Sprayer/PSI	Farm sprayer	BP 40	BP 40
Mix size	25 gal	2100	2100
Gallons H20/acre	20	20	20
Nozzle type	XR8003	5-XR8003	5-XR8002
Nozzle spacing and height	20/18	20/18-22	20/18-22
Soil inc. method/implement	Rotera; vertical tine tiller	-	-

Table 4. Effect of Asulox herbicide on spinach growth, Vegetable Research Farm, Corvallis, 2006.

	Herbicide and surfactant	Rate		Timing	Obs	17-Jul-06		29-Jul-06			
						Phyto	Stunting	Phyto		Stunting	
								Males	Females	Males	Females
						0-10	*%*	*------- 0-10 -----*		*--------- % --------*	
1	Asulox NIS	1.5	pts	2-4 leaf *14-Jul*	4	0.0	0	1.0	1.8	15	15
2	Asulox NIS	3	pts	2-4 leaf	4	0.9	5	1.3	1.8	15	25
3	Asulox NIS	3	pts	6-8 leaf *19-Jul*	3	0	0	1.0	0.0	10	10
4	Asulox NIS	6	pts	6-8 leaf	4	0	0	2.8	4.3	28	35
5	Asulox MSO	3	pts	2-4 leaf	4	0.8	8	1.5	2.0	18	18
6	Asulox MSO UAN	3	pts	2-4 leaf	4	1.3	0	1.8	3.5	30	45
	FPLSD (0.05)					*0.7*	*ns*	*1.8*	*2.6*	*ns*	*ns*

Table 5. Effect of Asulox on spinach dry matter and yield harvested from 10 ft of row, Vegetable Research Farm, Corvallis.

	Herbicide and surfactant	Rate		Timing	Obs	Plant no	Dry matter	Avg. plant wt.	Seed yield
							kg	*g*	*g/plot*
1	Asulox NIS	1.5	pts	2-4 leaf	4	10.8	1.2	110	179
2	Asulox NIS	3	pts	2-4 leaf	4	10.8	1.3	149	181
3	Asulox NIS	3	pts	6-8 leaf	3	9.5	1.4	196	134
4	Asulox NIS	6	pts	6-8 leaf	4	4.5	0.5	106	44
5	Asulox MSO	3	pts	2-4 leaf	4	10.5	1.4	134	159
6	Asulox MSO UAN	3	pts	2-4 leaf	4	9.8	0.8	75	107
7	Check	-		-	4	11.8	1.3	109	212
	FPLSD (0.05)					*ns*	*ns*	*ns*	*ns*

SQUASH

Squash Tolerance to Dimethenamid-P and Halosulfuron Tank Mixes in Wet Conditions

Ed Peachey, Horticulture, OSU

The objective of the experiment was to determine weed control efficacy of halosulfuron when tankmixed with dimethenamid-p. Halosulfuron can be used to improve control of species that are unaffected by dimethenamid-P, including common lambsquarters.

Methods and Results

Treatments were applied on May 19, 2006 to 10 by 40 foot plots with 3 replications. Little did we know that rain would fall for the next 3 weeks, but this provided an opportunity to evaluate crop tolerance under adverse conditions.

Stunting was noted in plots and tended to increase as halosulfuron rate increased. Black nightshade was controlled by dimethenamid-P, but there was no difference in control caused by halosulfuron. Halosulfuron improved lambsquarters control.

Table 1. Effect of halosulfuron on processing squash and weeds, Lebanon, 2006.

Herbicide	Timing	Rate	Obs.	Stunting	Weed Control	
				6/24/2006	Black nightshade	Lambsquarters
		lbs ai/A		*%*	--------------- % ----------------	
1. Dimethenamid-P	PES	0.656	3	20	93	88
2. Dimethenamid-P	PES	0.656	3	23	95	100
Halosulfuron	PES	0.023				
3. Dimethenamid-P	PES	0.656	3	30	93	100
Halosulfuron	PES	0.035				
4. Dimethenamid-P	PES	0.656	3	40	95	100
Halosulfuron	PES	0.047				
Check		0.000	3	0	0	0
FPLSD				ns	4	5

Table 2. Herbicide application data

Date	Friday, May 19, 2006
Application timing	PES
Start/end time	11-11:30 AM
Air temp/soil temp (2")/surface	62.2/69.1/71.4
Rel humidity	100%
Wind direction/velocity	SW 3 mph
Cloud cover	100
Soil moisture	Damp
Sprayer/PSI	BP 30
Mix size	2100
Gallons H20/acre	20
Nozzle number and type	5-8002
Nozzle spacing and height	20/18
Soil inc. method/implement	Plentiful rainfall over the next 3 weeks

SWEET CORN

Impact (Topramezone) Herbicide Efficacy in Sweet Corn

2005

Ed Peachey, Horticulture Department, OSU

Sweet corn (var. Coho) was planted on May 31, 2005 near Stayton, OR on a Jory soil with a ph of 5.8, OM of 15.8% (LOI) and CEC of 30.1 meq/g soil. Experimental plots were 10 by 30 ft and each treatment replicated 4 times. Preemergent treatments were applied the following day and were incorporated with rainfall over the next 2 weeks. EPOST treatments were applied on July 2 to corn that was 6-9" tall at the V4-5 growth stage. Corn was harvested on Sept. 15 from 20 ft of the middle row in each plot.

Results and Discussion

Impact herbicide caused very little phytotoxicity but reduced corn growth as much as 20% at 1 WAT when applied at the rate of 0.066 lbs ai/A. The growth reduction caused by Impact was not noted 4 WAT. Treatments with Callisto caused severe yellowing of the plants, but the symptoms dissipated within 4 weeks (Table 1). Accent tank mixed with Callisto significantly reduced yellowing of the corn caused by Callisto, suggesting an antagonism that has been observed in other experiments. Accent treatments restricted corn growth the most.

There was no yield from the check plots because extremely high weed densities deprived corn of soil moisture and provided cover for a large vole population that subsequently chewed the corn off at the base. Corn yield in the herbicide plots also was poor because of uneven and meager irrigation water applied during the season. Premature firing of lower leaves, likely due to drought stress, accounted for 60% of the yield variability (R^2=0.62). Because of this, yield was closely associated with weed control (R^2=0.61) and treatments with the best weed control generally yielded most. Dual Magnum PES only yielded 3.3 t/A because of very poor control of smartweed, the predominant weed at the site (Table 2). The addition of Impact herbicide (0.016 lb ai/A, Tr. 2) and atrazine (0.5 lbs ai/A) to Dual Magnum plots improved yield to 10.3 t/A. Accent alone only yielded 7.6 t/A, but tankmixing Aim with Accent increased yield to 9.0 t/A.

The predominant weed at the site was smartweed, with lesser densities of wild proso millet, pineapple weed and pigweed. Smartweed densities in Tr. 1 (Dual Magnum only) and the check were so high that wild proso millet growth was significantly reduced. Impact herbicide provided exceptional control of all species early in the season and acceptable control of wild proso millet through harvest, even when applied alone (Table 3).

Table 1. Crop response to herbicides, Stayton, 2005.

	Herbicide	timing	Rate	Obs	Phytotoxicity rating				Stunting or growth reduction			
					Weeks after EPOST treatment				Weeks after EPOST treatment			
					1	2	4	8	1	2	4	8
			lbs ai/A or % (v/v)		----------------0-10 ----------------				------------------% -------------			
1	Dual Mag.	PES	1.3	5	0	0	0	0.0	0	6	11	15
2	Dual Mag.	PES	1.3	2	1	0	0	0.0	10	0	0	0
	Impact	EPOST	0.016									
	Atrazine	EPOST	0.5									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
3	Dual Mag.	PES	1.3	2	2	0	0	0.0	15	5	0	0
	Impact	EPOST	0.033									
	Atrazine	EPOST	1%									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
3a	Dual Mag.	PES	1.3	2	1	1	0	0.0	20	5	0	0
	Impact	EPOST	0.066									
	Atrazine	EPOST	2									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
4	Dual Mag.	PES	1.3	4	2	0	0	0.0	16	3	0	0
	Impact	EPOST	0.016									
	Basagran	EPOST	0.5									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
5	Dual Mag.	PES	1.3	4	4	2	0	0.0	16	0	1	0
	Callisto	EPOST	0.094									
	Atrazine	EPOST	0.25									
	COC	EPOST	1%									
	N	EPOST	2.5%									
6	Dual Mag.	PES	1.3	4	7	3	0	0.0	16	4	0	0
	Callisto	EPOST	0.188									
	Atrazine	EPOST	0.5									
	COC	EPOST	1%									
	N	EPOST	2.5%									
7	Accent	EPOST	0.032	4	2	0	1	0.0	25	16	13	5
	COC	EPOST	1%									
	N	EPOST	2.5%									
8	Accent	EPOST	0.032	4	5	1	0	0.0	25	9	0	0
	Aim	EPOST	0.008									
	COC	EPOST	1%									
	N	EPOST	2.5%									

Table 1. cont'd

	Herbicide	timing	Rate	Obs	Phytotoxicity rating				Stunting or growth reduction			
					Weeks after EPOST treatment				Weeks after EPOST treatment			
					1	2	4	8	1	2	4	8
			lbs ai/A or % (v/v)		----------------0-10 ----------------				------------------% -------------			
9	Impact	EPOST	0.016	4	1	0	0	0.0	8	0	3	0
	MSO	EPOST	1%									
	N	EPOST	2.5%									
10	Check			4	0	0	0	0.0	0	18	20	43
11	Callisto	EPOST	0.094	4	8	3	0	0.0	16	15	5	3
	Basagran	EPOST	0.5									
	COC	EPOST	1%									
	N	EPOST	2.5%									
12	Callisto	EPOST	0.094	4	4	2	0	0.1	11	13	8	3
	Impact	EPOST	0.016									
	COC	EPOST	1%									
	N	EPOST	2.5%									
13	Callisto	EPOST	0.094	4	2	0	0	0.0	25	5	4	1
	Accent	EPOST	0.032									
	COC	EPOST	1%									
	N	EPOST	2.5%									
14	Impact	EPOST	0.032	4	1	0	0	0.0	5	1	0	0
	MSO	EPOST	1%									
	N	EPOST	2.5%									
	FPLSD				1.4	1	1	0.1	9	13	12	12

Table 2. Effect of herbicides on sweet corn yield (var. Coho), Stayton, OR 2005.

	Herbicide	timing	Rate	Obs.	Ear no.	Fresh wt. yield	Avg. ear wt.	Tip fill	Ear quality rating	Maturity rating	Irregular ears	Firing
			lbs ai/A or % (v/v)		no./A	t/A	lbs	%	0-10	0-10	%	0-10
1	Dual Mag.	PES	1.3	5	10300	3.3	0.48	61	1.6	2.4	22	4.6
2	Dual Mag.	PES	1.3	2	24800	10.3	0.85	96	8.5	8.5	0	1.0
	Impact	EPOST	0.016									
	Atrazine	EPOST	0.5									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
3	Dual Mag.	PES	1.3	2	22700	9.1	0.80	87	6.5	8.0	25	0.5
	Impact	EPOST	0.032									
	Atrazine	EPOST	1									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
3a	Dual Mag.	PES	1.3	2	21800	7.7	0.70	89	7.0	8.0	5	4.0
	Impact	EPOST	0.066									
	Atrazine	EPOST	2									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
4	Dual Mag.	PES	1.3	4	21600	8.0	0.75	94	7.3	7.8	5	2.8
	Impact	EPOST	0.016									
	Basagran	EPOST	0.5									
	MSO	EPOST	1%									
	N	EPOST	2.5%									
5	Dual Mag.	PES	1.3	4	22900	8.1	0.73	89	6.8	7.5	5	1.8
	Callisto	EPOST	0.094									
	Atrazine	EPOST	0.25									
	COC	EPOST	1%									
	N	EPOST	2.5%									
6	Dual Mag.	PES	1.3	4	23100	8.6	0.75	93	8.0	7.8	5	2.0
	Callisto	EPOST	0.188									
	Atrazine	EPOST	0.5									
	COC	EPOST	1%									
	N	EPOST	2.5%									
7	Accent	EPOST	0.032	4	22200	7.6	0.68	86	6.0	5.8	10	1.0
	COC	EPOST	1%									
	N	EPOST	2.5%									

Table 2. cont'd

	Herbicide	timing	Rate	Obs.	Ear no.	Fresh wt. yield	Avg. ear wt.	Tip fill	Ear quality rating	Maturity rating	Irregular ears	Firing
			lbs ai/A or % (v/v)		no./A	t/A	lbs	%	0-10	0-10	%	0-10
8	Accent	EPOST	0.032	4	24600	9.0	0.70	95	8.3	7.8	0	1.8
	Aim	EPOST	0.008									
	COC	EPOST	1%									
	N	EPOST	2.5%									
9	Impact	EPOST	0.016	4	22000	8.5	0.75	93	7.8	7.5	0	1.8
	MSO	EPOST	1%									
	N	EPOST	2.5%									
10	Check			4	0	0.0	0.00	0	0.0	0.0	0	5.7
11	Callisto	EPOST	0.094	4	20700	7.8	0.75	91	6.8	6.8	0	2.1
	Basagran	EPOST	0.5									
	COC	EPOST	1%									
	N	EPOST	2.5%									
12	Callisto	EPOST	0.094	4	21300	8.1	0.78	92	7.8	7.8	5	2.0
	Impact	EPOST	0.016									
	COC	EPOST	1%									
	N	EPOST	2.5%									
13	Callisto	EPOST	0.094	4	21800	8.4	0.80	88	6.3	7.5	10	2.0
	Accent	EPOST	0.032									
	COC	EPOST	1%									
	N	EPOST	2.5%									
14	Impact	EPOST	0.032	4	25000	9.8	0.78	97	9.0	8.5	3	1.3
	MSO	EPOST	1%									
	N	EPOST	2.5%									
	FPLSD					2.3	0.15	21	2.2	3.4	1.4	1.5

Table 3. Weed control in sweet corn, Stayton, 2005.

	Herbicide	timing	Rate	Obs.	Weed control (2 WAT)				Weed control (4 WAT)					Weed control (8 WAT)				
					Wild proso millet	Smart-weed	Pine-apple weed	Avg.	Wild proso millet	Smart-weed	Pine-apple weed	Pigweed	Avg.	Wild proso millet	Smart weed	Pine-apple weed	Pigweed	Avg.
			lbs ai/A or % (v/v)		--%--													
1	Dual Mag.	PES	1.3	5	67	36	49	52	97	21	91	89	28	76	20	92	95	45
2	Dual Mag	PES	1.3	2	93	99	100	97	53	93	95	100	80	55	95	100	100	83
	Impact	EPOST	0.016															
	Atrazine	EPOST	0.5															
	MSO	EPOST	1%															
	N	EPOST	2.5%															
3	Dual Mag	PES	1.3	2	97	100	100	99	92	98	100	100	94	93	100	100	100	93
	Impact	EPOST	0.033															
	Atrazine	EPOST	1															
	MSO	EPOST	1%															
	N	EPOST	2.5%															
3a	Dual Mag	PES	1.3	2	98	100	100	98	95	99	100	100	97	97	100	100	100	97
	Impact	EPOST	0.066															
	Atrazine	EPOST	2															
	MSO	EPOST	1%															
	N	EPOST	2.5%															
4	Dual Mag	PES	1.3	4	97	100	100	98	81	97	99	98	90	80	98	99	98	92
	Impact	EPOST	0.016															
	Basagran	EPOST	0.5															
	MSO	EPOST	1%															
	N	EPOST	2.5%															
5	Dual Mag	PES	1.3	4	97	100	100	97	73	99	100	100	87	69	99	98	100	89
	Callisto	EPOST	0.094															
	Atrazine	EPOST	0.25															
	COC	EPOST	1%															
	N	EPOST	2.5%															

Table 3. cont'd

	Herbicide	timing	Rate	Obs.	Weed control (2 WAT)				Weed control (4 WAT)					Weed control (8 WAT)				
					Wild proso millet	Smart-weed	Pine-apple weed	Avg.	Wild proso millet	Smart-weed	Pine-apple weed	Pigweed	Avg.	Wild proso millet	Smart weed	Pine-apple weed	Pigweed	Avg.
			lbs ai/A or % (v/v)		%													
6	Dual Mag	PES	1.3	4	96	100	100	98	66	100	100	100	87	73	100	98	99	84
	Callisto	EPOST	0.188															
	Atrazine	EPOST	0.5															
	COC	EPOST	1%															
	N	EPOST	2.5%															
7	Accent	EPOST	0.032	4	91	63	55	66	78	60	48	97	70	84	55	60	89	73
	COC	EPOST	1%															
	N	EPOST	2.5%															
8	Accent	EPOST	0.032	4	96	96	91	95	87	90	75	95	88	86	92	91	95	90
	Aim	EPOST	0.008															
	COC	EPOST	1%															
	N	EPOST	2.5%															
9	Impact	EPOST	0.016	4	94	99	94	96	80	91	78	94	86	83	95	89	96	85
	MSO	EPOST	1%															
	N	EPOST	2.5%															
10	Check			4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Callisto	EPOST	0.094	4	92	99	100	95	55	97	100	99	79	62	100	100	99	76
	Basagran	EPOST	0.5															
	COC	EPOST	1%															
	N	EPOST	2.5%															
12	Callisto	EPOST	0.094	4	98	100	100	99	80	95	100	97	88	88	99	100	90	91
	Impact	EPOST	0.016															
	COC	EPOST	1%															
	N	EPOST	2.5%															

Table 3. cont'd

	Herbicide	timing	Rate	Obs.	Weed control (2 WAT)				Weed control (4 WAT)					Weed control (8 WAT)				
					Wild proso millet	Smart-weed	Pine-apple weed	Avg.	Wild proso millet	Smart-weed	Pine-apple weed	Pigweed	Avg.	Wild proso millet	Smart weed	Pine-apple weed	Pigweed	Avg.
			lbs ai/A or % (v/v)		---%													---
13	Callisto	EPOST	0.094	4	98	98	100	98	84	94	100	96	91	84	99	96	97	83
	Accent	EPOST	0.032															
	COC	EPOST	1%															
	N	EPOST	2.5%															
14	Impact	EPOST	0.032	4	98	99	100	96	83	90	93	86	81	83	94	96	86	83
	MSO	EPOST	1%															
	N	EPOST	2.5%															
	FPLSD				19	12	22	16	32	9	21	12	18	34	15	8	7	20

Table 4. Herbicide application data.

Date	Wednesday, June 1, 2005	Saturday, July 02, 2005
Crop stage	Planted on May 31	6-9"; V4, 5 true leaves
Weeds		Smartweed 2-6"; WPM 4 inches
Herbicide/treatment	Dual Magnum	All post treatments
Application timing	PES	EPOST
Start/end time	9:30-10:00 AM	7-8:30 AM
Air temp/soil temp (2")/surface	56/56/57	62/64/62
Rel humidity	Raining lightly	95%
Wind direction/velocity	2-4 SE	0
Cloud cover	100	100
Soil moisture	Very wet	Dry
Plant moisture	-	Wet
Sprayer/PSI	BP/30	BP/40
Mix size	3 gal	2.1 L
Gallons H_20/acre	20	20
Nozzle type	8002	8002
Nozzle spacing and height	20/18-24	5-20/18-24 (8.3 ft wide)
Soil inc. method/implement	Rain	-

Crop Tolerance and Efficacy of Impact Herbicide on Sweet Corn

2006

Ed Peachey, OSU Horticulture Dept.

Introduction

Impact herbicide was recently registered for weed control in sweet corn. The objectives of this project were to evaluate the weed control potential of this product (especially wild proso millet and puncturevine), and sweet corn tolerance to Impact under a variety of conditions, particularly when tankmixed with other soil active herbicides. Plots were located near Stayton and Dayton.

Stayton

Methods

The experiment was located on a Newberg silt loam soil with a pH of 5.9, OM of 2.5 %, and CEC of 20 meq/100 g soil. Preplant herbicides and Lorsban (on designated plots) were broadcast prior to final rototilling. Plots were 10 by 30 ft with four replications of each treatment. Sweet corn (var. Bonus) was planted on June 15, 2006 and PES herbicides applied on June 16, EPOST herbicides applied on July 3, and POST herbicides applied on July 13. Corn growth and weed control were evaluated throughout the season, corn height measured at mid-season, and yield measured by picking 2- 8 ft rows of corn from selected plots.

Results

Wild proso millet (WPM) density was low at this site, possibly because of late planting that caused a large flush of millet before final soil tillage (rain forced planting in late June rather than late May as originally planned).

Impact provided exceptional control of wild proso millet (Table 1) whether applied as a tankmix or alone. Impact controlled millet plants that were up to 12 in. tall. Crop tolerance to Impact also was very good. However, the data suggest that Impact may have caused more injury to corn when applied in a tankmix with Outlook and a modified seed oil (MSO) rather than a non-ionic surfactant (NIS) (comparison of Trs. 7 and 8). Additionally, significant crop injury was noted when Outlook was tankmixed with atrazine and applied EPOST; adding Impact to this tankmix reduced corn height by 1/3 ft. but did not significantly reduce yield (Table 3). Outlook is known to occasionally damage corn leaves when applied POST, particularly if the weather is hot.

The registration of Impact herbicide on sweet corn will significantly reduce the impact of wild proso millet on corn production. However, because Impact does not provide residual control of wild proso millet, future research should test one-pass programs that will deliver burndown and residual control while minimizing the number of trips across the field. Outlook, Dual Magnum, and Prowl are potential tank mix partners. Prowl should be avoided as a tank mix with Impact because of its propensity to increase lodging of corn. As in years past, **all** of the corn at this site that was treated with Prowl lodged. Tankmixes of Prowl with Impact herbicide should be discouraged.

Dayton

Methods

Plots were 10 by 25 ft and arranged in a RCBD. Sweet corn (var. Punch) was strip-till planted and Dual Magnum and atrazine applied by the grower after planting. Significant rainfall shortly after planting eliminated the efficacy of Dual Magnum and provided a good flush of wild proso millet seedlings. All treatments were applied on July 14. Crop growth and weed control were evaluated throughout the season and corn harvested from 2- 8 ft sections of one row. Only treatments that had 3 replications remaining were harvested, because the grower inadvertently harvested some of the plots on one side of the experiment.

Results

WPM density at this site was great enough to reduce sweet corn yield. However, corn growth was highly variable within the experiment (due to less than ideal planting conditions) and treatment effects on corn yield were difficult to ascertain. The check treatment only yielded 5.3 t/A, even though the plots of this treatment had Dual Magnum and atrazine applied to them after planting (Table 4). Impact controlled WPM very well in all treatments, and in some cases controlled millet that was 14 inches tall. Tank mixing Impact and Accent did not significantly improve weed control, but did significantly increase crop injury. Lowering the rate of MSO that was applied with Impact (from 1% to 0.25%) may have reduced WPM control and yield compared to Impact applied with 1% MSO. The addition of UAN did not improve WPM control. Impact killed WPM and reduced competition with the corn crop, but did not stop WPM seed production. Whether this will result in a decline in seed density in the soil over time is unknown. Strategies should be developed that provide residual control of WPM as well as the burndown provided by Impact herbicide.

Table 1. Weed control and sweet corn response to Impact herbicide, Stayton, OR, 2006.

No.	Product	Rate	Timing	Phytotoxicity		Stunting		Corn height	WPM density	WPM control
				7-13-06 10 DA EPOST	*7-15-06 12 DA EPOST*	*7-13-06 10 DA EPOST*	*7-15-06 12 DA EPOST*	*8-9-06 4 WA POST*	*7-27-06*	*8-9-06*
		lbs ai/A or %		*0-10*		*% (0-100)*		*Ft.*	*No/240 ft^2*	*%*
1	Untreated	-	-	0	0	0	0	5.4	7.5	-
SEQUENTIAL										
2	Eradicane	4.2	PPI	0	0	0	0	5.1	2.0	84
	Outlook	0.84	PRE							
3	Eradicane	4.2	PPI	0	0	0	0	5.4	0.5	98
	Lorsban	2.0	PPI							
	Outlook	0.84	PRE							
4	Outlook	0.84	PRE	0	0.5	3	10	4.7	0	100
	Impact	016	V2-3							
	MSO	1 %	V2-3							
	UAN 28%	2.5 %	V2-3							
5	Outlook	0.84	PRE	0.8	0	1	8	4.7	0	100
	Impact	0.016	V2-3							
	Atrazine	0.5	V2-3							
	MSO	1 %	V2-3							
EARLY POSTEMERGENCE										
6	Outlook	0.84	V2-3	1.5	0	1	15	5.2	14.5	55
	Atrazine	0.5	V2-3							
	MSO	1 %	V2-3							
	UAN 32%	2.5 %	V2-3							
7	Impact	0.016	V2-3	0.6	0	0	0	5.2	0.5	100
	Outlook	0.84	V2-3							
	Atrazine	0.5	V2-3							
	NIS	0.25 %	V2-3							
	UAN 28%	2.5 %	V2-3							
8	Impact	0.016	V2-3	1.8	0	4	5	4.8	0.5	100
	Outlook	0.84	V2-3							
	Atrazine	0.5	V2-3							
	MSO	1 %	V2-3							
	UAN 32%	2.5 %	V2-3							
9	Callisto	0.094	V2-3	1.8	0.3	0	8	5.1	0.3	98
	Outlook	0.84	V2-3							
	Atrazine	0.5	V2-3							
	UAN 32%	2.5 %	V2-3							
10	Prowl H2O	1.66	V2-3	0.9	0	0	3	5.2	6.3	83
	Atrazine	0.5	V2-3							
	MSO	1 %	V2-3							
	UAN 32%	2.5 %	V2-3							
11	Impact	016	V2-3	0.8	0	0	0	5.4	0	100
	Prowl H2O	1.66	V2-3							
	Atrazine	0.5	V2-3							
	MSO	1 %	V2-3							
	UAN 32%	2.5 %	V2-3							

Table 1 cont'd

No.	Product	Rate	Timing	Phytotoxicity		Stunting		Corn height	WPM density	WPM control
				7-13-06 10 DA EPOST	*7-15-06 12 DA EPOST*	*7-13-06 10 DA EPOST*	*7-15-06 12 DA EPOST*	*8-9-06 4 WA POST*	*7-27-06*	*8-9-06*
		lbs ai/A or %		*0-10*		*% (0-100)*		*Ft.*	*No/240 ft^2*	*%*
POSTEMERGENCE										
12	Impact	0.016	V4-5	3.3	1.0	18	15	5.5	0	100
	Accent	031	V4-5							
	Atrazine	0.5	V4-5							
	MSO	1 %	V4-5							
	UAN 32%	2.5 %	V4-5							
13	Impact	0.016	V4-5	3.0	1.5	28	12	5.3	0.3	100
	Option	0.033	V4-5							
	Atrazine	0.5	V4-5							
	MSO	1.000	V4-5							
	UAN 32%	2.5 %	V4-5							
14	Impact	0.016	V4-5	0	0.8	0	0	5.3	0.8	98
	Atrazine	0.5	V4-5							
	MSO	1 %	V4-5							
	UAN 32%	2.5	V4-5							
15	Impact	0.016	V4-5	0	0	0	0	5.4	0.5	100
	Atrazine	0.5	V4-5							
	Renegade	1.75	V4-5							
16	Impact	0.016	V4-5	0.3	0	3	2	5.3	0.5	100
	Atrazine	0.5	V4-5							
	Renegade	1.75	V4-5							
	Inplace	0.75	V4-5							
17	Impact	0.016	V4-5	0	0	0	0	5.5	1.0	100
	MSO	1	V4-5							
	UAN 32%	2.5 %	V4-5							
18	Accent	0.032	V4-5	2.5	1.3	15	20	5.2	2.0	99
	Atrazine	0.5	V4-5							
	COC	1%	V4-5							
19	Accent	0.032	V4-5	5.0	2.8	28	32	4.9	0.8	100
	Aim	0.008	V4-5							
	COC	1%	V4-5							
LSD (0.05)				0.7	1.5	9	12	0.5	3.8	25

Table 2. Herbicide and weed control effects on sweet corn yields, Stayton, OR, 2006.

No.	Product	Rate	Timing	Corn yield			
				Ear number	Fresh wt yield	Avg. ear wt.	Husked ear avg. wt
		lbs ai/A or %		*No./A*	*t/A*	*kg*	*kg*
1	Untreated	-	-	27446	12.4	0.43	0.26
SEQUENTIAL							
2	Eradicane	4.2	PPI	28553	11.9	0.38	0.27
	Outlook	0.84	PRE				
3	Eradicane	4.2	PPI	30545	12.2	0.37	0.26
	Lorsban	2.0	PPI				
	Outlook	0.84	PRE				
4	Outlook	0.84	PRE	26561	11.1	0.38	0.26
	Impact	016	V2-3				
	MSO	1 %	V2-3				
	UAN 28%	2.5 %	V2-3				
5	Outlook	0.84	PRE	26893	11.2	0.38	0.21
	Impact	0.016	V2-3				
	Atrazine	0.5	V2-3				
	MSO	1 %	V2-3				
EARLY POSTEMERGENCE							
6	Outlook	0.84	V2-3	26561	11.3	0.38	0.26
	Atrazine	0.5	V2-3				
	MSO	1 %	V2-3				
	UAN 32%	2.5 %	V2-3				
8	Impact	0.016	V2-3	28221	10.9	0.36	0.24
	Outlook	0.84	V2-3				
	Atrazine	0.5	V2-3				
	MSO	1 %	V2-3				
	UAN 32%	2.5 %	V2-3				
9	Callisto	0.094	V2-3	29549	11.7	0.36	0.27
	Outlook	0.84	V2-3				
	Atrazine	0.5	V2-3				
	UAN 32%	2.5 %	V2-3				
POSTEMERGENCE							
12	Impact	0.016	V4-5	28221	11.5	0.37	0.26
	Accent	031	V4-5				
	Atrazine	0.5	V4-5				
	MSO	1 %	V4-5				
	UAN 32%	2.5 %	V4-5				
14	Impact	0.016	V4-5	29549	12.3	0.38	0.27
	Atrazine	0.5	V4-5				
	MSO	1 %	V4-5				
	UAN 32%	2.5	V4-5				

Table 2, cont'd

No.	Product	Rate	Timing	Corn yield			
				Ear number	Fresh wt yield	Avg. ear wt.	Husked ear avg. wt
		lbs ai/A or %		*No./A*	*t/A*	*kg*	*kg*
15	Impact	0.016	V4-5	27889	12.1	0.40	0.26
	Atrazine	0.5	V4-5				
	Renegade	1.75	V4-5				
16	Impact	0.016	V4-5	26229	11.1	0.38	0.27
	Atrazine	0.5	V4-5				
	Renegade	1.75	V4-5				
	Inplace	0.75	V4-5				
17	Impact	0.016	V4-5	30213	12.7	0.38	0.27
	MSO	1	V4-5				
	UAN 32%	2.5 %	V4-5				
18	Accent	0.032	V4-5	30102	12.1	0.36	0.26
	Atrazine	0.5	V4-5				
	COC	1%	V4-5				
19	Accent	0.032	V4-5	23462	9.6	0.37	026
	Aim	0.008	V4-5				
	COC	1%	V4-5				
LSD (0.05)				4061	ns	ns	ns

Table 3. Herbicide application data for Stayton site, 2006.

Date	June 14, 2006	June 24, 2006	July 03, 2006	July 13, 2006
Crop stage	-	Planted 6/20/2006	V 2-3	V4- some V5, up to 14 inches tall
Weeds and growth stage				
Millet	-	Few millet have emerged	Very few millet, cotyledon to1-2 inches tall	4-leaf to 12 inch diameter plants with 6 leaves or more
Pigweed	-	-	-	12 inches tall
Application timing	PPI	PES	EPOST (V2-3)	POST (V4-5)
Start/end time	10-10:15	6-7 AM	7-8 AM	6:30-8:00 AM
Air temp/soil temp (2")/surface	64/69/71	62/64/62	62/56/59	63/65/67
Relative humidity (%)	100	80	82	88
Dew point	-	-	-	59
Wind direction/velocity	3-6 SE	0-0.5 SE	0-2.8 SW	0-1.2 NW
Cloud cover	100	0	0	100
Soil moisture	Damp	Dry	Dry	Very wet - just irrigated day prior
Plant moisture	-	-	Light dew	Plants very wet - some collars filled with water
Sprayer/PSI	BP 30	BP40	BP40	BP40
Mix size	2100	2100	2100	2100
Gallons H20/acre	20	20	20	20
Nozzle type	8003	8003	8003	8003
Nozzle spacing and height	20/18	20/18	20/18	20/18
Soil inc. method/implement	Field cultivator and leveler within 15 min.	Plan to irrigate next morning		Irrigated yesterday
	Rototilled on 6-16 before planting			

Table 4. Weed control with Impact herbicide, Dayton, OR, 2006.

	Herbicides[1]/surfactants	Rate	*Obs.*	Phytotoxicity rating			Stunting			WPM control		*Obs*	Harvest			
		lbs ai/A or %		21-Jul	26-Jul	9-Aug	21-Jul	26-Jul	9-Aug	26-Jul	9-Aug		Ear count	Fresh wt.	Avg. ear wt.	WPM control
				----------0-10 ----------			-----------%------------			-------%--------			*no/A*	*t/A*	*kg*	*%*
1	Check		*4*	0	0	0	0	0	10	0	0	*3*	13458	5.3	0.36	0
2	Impact	0.016	*4*	1.5	3.8	3.0	13	43	40	93	88		-	-	-	-
	Accent	0.031														
	Atrazine	0.500														
	MSO	1%														
	UAN 28%	2.5%														
3	Impact	0.016	*4*	0	0	0	0	0	15	95	88	*3*	17353	7.9	0.42	82
	Atrazine	0.500														
	MSO	1%														
	UAN 32%	2.5%														
4	Impact	0.016	*4*	0.3	0	0	3	0	0	95	86	*3*	16645	7.8	0.43	78
	Atrazine	0.500														
	Renegade[2]	1.75 pts/A														
	Inplace	0.75 oz/A														
5	Impact (0.5 oz)	0.011	*4*	0	0	0	0	3	10	96	81	*2*	21780	9.2	0.38	83
	MSO	1%														
	UAN 32%	2.5%														
6	Impact	0.016	*4*	0	0	0	0	0	9	86	78	*3*	12041	5.5	0.44	67
	MSO	0.25%														
7	Impact	0.016	*4*	0	0	0	0	0	3	93	85	*4*	20983	9.3	0.40	74
	MSO	1%														
8	Impact	0.016	*4*	0	0	0	0	0	8	97	90	*3*	19832	8.8	0.40	80
	MSO	1%														
	UAN 32%	2.5%														
9	Accent	0.032	*4*	3.0	3.0	2.5	25	30	35	89	91	-	-	-	-	-
	Atrazine	0.500														
	MSO	1%														
	UAN 32%	2.5%														
10	Accent	0.032	*4*	3.5	3.5	3.0	30	35	19	90	93	-	-	-	-	-
	MSO + UAN (32%)															
FPLSD (0.05)				0.7	0.7	0.7	9	9	22	6	11		6210	2.4	ns	28

[1] Dual Magnum and atrazine were applied to the entire field at planting.

[2] MSO = Super Spread (Wilbur Ellis); NIS = Preference (Agriliance); Renegade = modified vegetable oil and nitrogen blend (Wilbur Ellis); Inplace=deposition and drift management agent (Wilbur Ellis).

Table 5. Schedule and herbicide application data, Dayton, 2006.

Date	Friday, July 14, 2006
Crop stage	v5; 6-14 tall, irregular on this edge of field
Weeds and growth stage	
Millet	2-4" tall; up to 8" in dia.
Lambsquarters	4-6 lf, very few
Application timing	POST
Start/end time	7-8 AM
Air temp/soil temp (2")/surface	70/72/72
Relative humidity	65%
Dew point	52%
Wind direction/velocity	0
Cloud cover	0
Soil moisture	Very dry, plans to irrigate within 12 hrs
Plant moisture	Light dew
Sprayer/PSI	BP/40
Mix size	2100 mls/4.8 plots
Gallons H_20/acre	20
Nozzle type	New 8002 and 50 screens
Nozzle spacing and height	20/24” above soil to avoid high conc. on corn whorls

Sweet Corn Cultivar Tolerance to Post-Emergent Application of Callisto Herbicide

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Introduction

Callisto (mesotrione) has recently been labeled for use in sweet corn. It is touted as an excellent broadleaf herbicide when applied post-emergence that fits well into the sweet corn rotation for control of volunteer potato. In a 2004 field trial, Callisto applied in a tank mix with ammonium sulfate resulted in foliar injury to several sweet corn cultivars currently in production in the Columbia basin (data not shown).

Materials and Methods

In 2005, thirty-six sweet corn cultivars (Table 1) were evaluated for tolerance to Callisto herbicide, without the addition of ammonium sulfate to the tank mix. Plots were seeded to 30,800 plants/acre on May 16 and Jun 23 on the Hermiston Agricultural Research and Extension Center, in a field planted to potato the previous year. Seed for four cultivars was not received by the first planting date, and those cultivars received only the control and late-post treatments. The soil was an Adkins fine sandy loam (pH 6.7, 0.9% organic matter). The four 30 ft rows/plot were spaced 30 inches apart. The experimental design was a randomized complete block, with four replications. Normal commercial production practices were followed. The crop was produced under center pivot irrigation.

All plots received Dual Magnum at 1.33 pt/A applied post-plant, pre-emergence. Callisto was applied at 3.0 oz/A with a non-ionic surfactant at 0.25% v/v either early post (6-15" crop height) or late post (15-30" crop height). Treatments were applied on Jun 14 (early post) and Jul 22 (late post), with a tractor-mounted boom sprayer using XR80015VS spray nozzles spaced at 20 inches, at 40 psi, in 22 gpa water, at 2 mph, with a non-ionic surfactant at 0.25% v/v.

Results

Treatments were evaluated at 7, 14, and 28 days after application. No sweet corn injury was observed at any growth stage. Volunteer potato control was rated at 80% at 1 week, 90% at 2 weeks, and 100% at 4 weeks after treatment. Control of lambsquarters (*Chenopodium album*) was about 60%. Scattered Russian thistle (*Salsola kali*) was not well controlled. Barnyardgrass (*Echinochloa crus-galli*) became a severe problem later in the season.

Callisto provided excellent control of volunteer potato, with no visual injury to the cultivars evaluated.

Table 1. Sweet corn cultivars evaluated for Callisto herbicide tolerance, Hermiston, OR. 2005.

Cultivar	Seed Source
su:	
CSUYP2-28	Crookham
GH 1703	Syngenta
GH 2547	Syngenta
GH 2690	Syngenta
GH 6462	Syngenta
Harvest Gold	Seminis**
Intrigue	Crookham
Jubilee	Syngenta
Legacy	Harris Moran
Maestro	Crookham
Sockeye	Harris Moran
se/su:	
Chase	Seminis
Cinch	Seminis
CSEYP1-3	Crookham
EX08716607	Seminis**
Powerhouse	Seminis sh2:
ACX 642AW	Abbott & Cobb
ACX 726BC	Abbott & Cobb
ACX 820Y	Abbott & Cobb
ACX 900Y	Abbott & Cobb
Accession	Abbott & Cobb
Basin	Seminis
Crisp n Sweet 710	Crookham
EX08705808	Seminis**
GSS 2914	Syngenta
GSS 3287	Syngenta
Krispy King	Syngenta
Marvel	Crookham
Max	Harris Moran
Obsession	Seminis
Passion	Seminis**
Shaker	Seminis
Sheba	Seminis
Summer Sweet #50	Abbott & Cobb
Summer Sweet #610	Abbott & Cobb
Supersweet Jubilee	Syngenta

** Late post application only.

MIXED VEGETABLES

Vegetable Crop Tolerance to Dimethenamid-P

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Introduction

Experiments were conducted on a silt loam soil to determine crop tolerance to dimethenamid-P

Methods

Dimethenamid-P was applied EPOST, and PES + EPOST (Table 1) to crops listed in Table 2. Trifluralin (PPI) and napropamide (PES) were applied to minimize the need for hand-weeding of broccoli, cabbage, cauliflower, Chinese cabbage, and pak choi; napropamide (PES) was applied to turnips and rutabagas. The two middle rows of the Brassica crops were planted at slightly different depths to determine if depth of seeding would influence crop tolerance. Crops were grown in separate plots with the exception of turnips and rutabagas, bunching onions and leeks, and coriander and parsley which were grown side by side (2 rows of each per plot). Plots were 4.5 ft by 15 ft, with 4 rows per plot on 18 inch centers, and in a randomized complete block design with 4 replications. All treatments were applied with a hand-held boom with 4 nozzles on 20 in. spacing, pressured with CO_2 at 30-40 PSI, and delivered in 20 GPA of water. Herbicides were incorporated with irrigation water shortly after planting, and the surface kept damp to improve emergence by irrigating regularly until emergence had ceased (every other day). EPOST treatments were applied shortly after the first true leaf emerged (Table 2), followed by irrigation the next day. After initial crop injury and phytotoxicity ratings (approx. 3 WAP), plots were cultivated and hand-weed. Cabbage and cauliflower were thinned by removing approximately 2/3 of the plants, regardless of stand. Crops were harvested, graded, and weighed as appropriate for each crop.

Results & Discussion

Dimethenamid-P PES provided exceptional control of hairy nightshade and other summer annuals in Brassica crops when applied over trifluralin (PPI) and napropamide (PES) (Table 3). Weed control was less (76%) when dimethenamid-P was applied EPOST to 1/2 to 1 true-leaf brassica crops.

Among the brassica crops, stunting caused by dimethenamid-p was least with broccoli and greatest with Chinese cabbage (Tables 4-8; Figure 1). Emergence of Chinese cabbage, cabbage, and pak choi may have been reduced slightly by dimethenamid-P PES. Yield of broccoli was not impacted by dimethenamid-P at the 1x rate PES, EPOST, or PES+EPOST compared to the hand-weeded and cultivated checks (Table 4). Cabbage and cauliflower yield may have been reduced slightly with dimethenamid-P at 0.75 lbs. ai/A PES. Chinese cabbage and pak choi yields were severely curtailed by dimethenamid-P applied both PES and EPOST. There was very little indication that increased planting depth influenced emergence (Figure 2) or early season growth (data not shown).

Coriander and spinach yields were not reduced by dimethenamid-P applied PES at 0.375 lbs ai/A, even though growth was significantly reduced for spinach at 3 WAP (Table 9). Parley and parsnip growth was significantly reduced by dimethenamid-P (Table 10) and potential yields so low that crops were not harvested. Parsnip emergence was very poor, possibly because of heat induced seed dormancy. Turnips appeared to be more tolerant than rutabagas to dimethenamid-P (Table 11). Stunting was significant at 3 WAP for both crops, and yields were depressed compared to the hand-weeded check plots. Bunching onions were tolerant to dimethenamid-P at 0.375 lbs ai/A (Table 12). Leek response to dimethenamid-P was similar to onions, but will be harvested in February (data not shown).

Dimethenamid-P may be suited for weed control in processed broccoli, cauliflower, cabbage, cauliflower, turnips and rutabagas. Fresh market crops such as spinach or turnips and rutabagas may be less suited if days-to-maturity is extremely important. Future research should measure and compare tolerance of other *Brassica oleracea, B. rapa, and B. napus* crops to dimethenamid-P.

Table 1. Herbicide treatments applied to vegetables crops.

	Treatment	Timing	Rate
			lbs ai/A
1	Dimethenamid-P	PES	0.375
2	Dimethenamid-P	PES	0.75
3	Dimethenamid-P	EPOST	0.75
4	Dimethenamid-P	EPOST	1.5
5	Dimethenamid-P	PES	0.375
		EPOST	0.75
6	Dimethenamid-P	PES	0.75
		EPOST	1.5
7	Hand-weeded	-	-
8	Cultivated once	-	-

Table 2. Vegetable varieties and cultural practices.

	Crop	Variety	% germ	Planting date	Seed rate) (no/ft	Planting depth	EPOST (treatments 3 and 4) Date	Timing	EPOST treatments 5 and 6 Date	Timing	Other herbicides applied
1	Broccoli	Southern Comet	87 (11/04)	June 24	3	½ in; ¾ in[a]	7/5	½ -1 true lf[b]	7/5	½ -1 true lf	Treflan (PPI); Devrinol (PES)
2	Cabbage	Late Flat Dutch	90 (11/04)	June 24	3	½ in; ¾ in[a]	7/5	½ -1 true lf	7/7	½ -1 true lf	Treflan (PPI); Devrinol (PES)
3	Cauliflower	Snowball improved	90 (11/04)	June 24	3	½ in; ¾ in[a]	7/5	½ -1 true lf	7/7	½ -1 true lf	Treflan (PPI); Devrinol (PES)
4	Chinese cab.	Blues	95 (11/04)	June 24	3	½ in; ¾ in[a]	7/2	½ -1 true lf	7/5	½ -1 true lf	Treflan (PPI); Devrinol (PES)
5	Coriander	LS	95 (10/04)	June 29	10	½ to ¾ in	7/15	2 leaf	7/15	2 leaf	Vapam (rotovate and roll 4 WBP)
6	Leeks	Arkansas winter leek	93 (8/04)	June 29	6	½ to ¾ in	7/15	Loop stage	7/15	Loop stage	Vapam (rotovate and roll 4 WBP)
7	Onions, bunching	Southport White Globe	83 (11/04)	June 29	12	½ to ¾ in	7/15	1st leaf unfolded	7/15	1st leaf unfolded	Vapam (rotovate and roll 4 WBP)
8	Pak choi	Joi Choi	99 (12/04)	June 24	3	½ in; ¾ in[a]	7/2	½ -1 true lf	7/5	½ -1 true lf	Treflan (PPI); Devrinol (PES)
9	Parsley	Dark Green Italian	95 (2/05)	June 29	20	¼ to ½ in	7/15	Cotyledons	7/15	Cotyledons	Vapam (rotovate and roll 4 WBP)
10	Parsnips	Cobham improved	96 (11/04)	June 29	4	½ to ¾ in	7/15	Cotyledon	7/19	1st leaf emerging	Vapam (rotovate and roll 4 WBP)
11	Rutabagas	American Purple Top	86 (11/04)	June 29	3	¾ in	7/11	½ leaf	7/15	2 leaf	Devrinol (PES)
12	Spinach	Olympia	92 (11/04)		3	¾ in	7/11	2 leaf	7/15	2 leaf	None
13	Turnips	Purple Top White Globe	96 (11/04)	June 29	3	¾ in	7/11	1.5 leaf	7/15	2 leaf	Devrinol (PES)

Table 3. Weed control (primarily hairy nightshade) at 3 WAP with dimethenamid-P applied over trifluralin (PPI) and napropamide (PES). Values are average of data from five Brassica vegetable crops that were planted on June 24, 2005 (n=20).

	Herbicide	Timing	Rate	Weed control	SD
			lb ai/A	---------% -----	
1	Dimethenamid-P	PES	0.375	99	3
2	Dimethenamid-P	PES	0.75	99	3
3	Dimethenamid-P	EPOST	0.75	76	22
4	Dimethenamid-P	EPOST	1.5	85	16
5	Dimethenamid-P	PES EPOST	0.375 0.75	99	3
6	Dimethenamid-P	PES EPOST	0.75 1.5	99	3
7	Check (trifluralin + napropamide +)	-	-	0	0

Table 4. Effect of dimethenamid-P on broccoli growth and yield.

Tr. No.	Plant stand	Phyto. rating (3 WAP)	Stunting (3 WAP)	Weed control (3 WAP)	Sum or avg. of 2 harvests (10 and 11 WAP)			
					Number heads	Total yield	Avg. head diameter	Avg. head wt
	no/8.2 ft	*0-10*	*%*	*%*	*no/20ft of row*	*t/A*	*in.*	*lbs*
1	17	0	6	99	27	7.4	5.1	0.39
2	15	0	11	100	24	7.1	5.2	0.41
3	17	0.3	9	58	25	7.3	5.1	0.43
4	17	0	6	64	28	7.0	4.8	0.34
5	17	0	11	100	25	7.5	5.1	0.40
6	15	0	30	100	20	5.9	4.7	0.45
7	14	0	3	-	25	7.1	5.1	0.39
8	17	0	1	0	22	5.0	4.8	0.31
FPLSD	ns	ns	15	18	ns	1.5 [a]	ns	ns

[a] P = 0.10

Table 5. Effect of dimethenamid-P on cabbage growth and yield.

Tr. No.	Plant stand	Phyto. rating (3 WAP)	Stunting (3 WAP)	Weed control (3 WAP)	Harvest (13 WAP)		
					Number heads	Total yield	Avg. head wt
	no/8.2 ft	*0-10*	*%*	*%*	*no./10 ft of row*	*t/A*	*Lbs.*
1	38	0	15	96	6.3	55.8	6.2
2	28	0	38	98	6.0	47.8	5.4
3	35	1	5	69	6.3	47.2	5.2
4	32	2	18	81	7.0	58.4	5.8
5	32	4	25	98	6.8	55.4	5.7
6	31	1	35	97	6.0	54.2	6.3
7	33	0	4	0	6.8	53.5	5.5
8	37	0	5	0	6.5	28.3	3.0
FPLSD	7	3.4	16	10	1.6	13.8	1.1

[a] P = 0.10

Table 6. Effect of dimethenamid-P on cauliflower growth and yield.

Treatment	Plant stand	Phyto. rating	Stunting	Weed control	Harvest (13 WAP)		
	(3 WAP)	(3 WAP)	(3 WAP)	(3 WAP)	Number heads	Total yield	Avg. head wt
	no./8.2 ft	*0-10*	*%*	*%*	*no./10 ft of row*	*t/A*	*lbs*
1	14	0.3	23	98	5	16.6	1.0
2	13	0.5	48	96	4	14.5	1.2
3	16	1.0	30	64	4	11.3	0.8
4	17	0.8	25	80	5	14.8	0.9
5	15	1.0	36	96	4	11.1	1.0
6	15	0.7	37	98	3	11.3	1.1
7	17	0.0	5	0	5	17.2	1.0
8	18	0.0	0	0	0	0.8	0.3
FPLSD	ns	0.7	18	11	2	7.8	0.5

[a] P = 0.10

Table 7. Effect of dimethenamid-P on Chinese cabbage growth and yield.

Treatment	Plant stand	Phyto. rating	Stunting	Weed control	Harvest (42 DAP)		
	(3 WAP)	(3 WAP)	(3 WAP)	(3 WAP)	Number heads	Total yield	Avg. head wt
	no./8.2 ft	*0-10*	*%*	*%*	*no/20ft of row*	*t/A*	*Lbs*
1	16	4.0	68	99	29	11.9	1.2
2	6	6.5	95	100	9	2.3	0.7
3	18	3.5	60	96	30	12.0	1.1
4	16	5.8	68	99	27	7.4	0.8
5	14	6.0	75	99	19	6.5	0.9
6	8	9.3	96	99	7	0.4	0.1
7	20	0.0	13	0.0	38	21.9	1.6
8	19	0.0	0	0.0	43	19.2	1.2
FPLSD	6	1.7	17	3	9	3.8	0.23

[a] P = 0.10

Table 8. Effect of dimethenamid-P on pak choi growth and yield.

Tr. No.	Plant Stand	Phyto. rating (3 WAP)	Stunting (3 WAP)	Weed control (3 WAP)	Harvests (40 DAP)		
					Number heads	Total yield	Avg. head wt
	No./8.2 ft	*0-10*	*%*	*%*	*no/20ft of row*	*t/A*	*Lbs*
1	21	4	48	100	42	14.4	1.0
2	18	8	83	100	30	7.6	0.7
3	22	4	48	95	43	14.7	1.0
4	23	6	63	100	45	11.1	0.7
5	22	6	68	100	43	12.6	0.8
6	17	10	90	100	21	2.1	0.3
7	24	0	3	0	48	22.3	1.3
8	23	0	0	0	72	25.3	1.3
FPLSD	2	2	8	5	27	2.2	0.3

[a] P = 0.10

Table 9. Effect of dimethenamid-P on coriander and spinach growth and yield.

Treatment	Coriander				Spinach				
	Stand (3 WAP)	Stunting (3 WAP)	Phyto-Toxicity (3 WAP)	Yield (8 WAP)	Stand (3 WAP)	Stunting (3 WAP	Phyto-toxicity (3 WAP)	No. plants harvested (7 WAP)	Yield (7 WAP)
	no/5 ft	*%*	*0-10*	*lbs/8.2 ft*	*no/3 ft*	*%*	*0-10*	*lbs/8.2 ft*	t/A
1	40	0	0.0	2.1	9	38	1	23	23.2
2	42	30	0.8	1.4	8	65	3	19	14.7
3	39	1	2.0	1.5	10	50	4	22	20.0
4	42	8	2.5	1.3	11	55	4	21	10.6
5	44	25	2.5	1.2	10	45	2	24	18.8
6	40	63	3.5	0.3	8	78	4	15	6.2
7	45	0	0.0	1.9	8	0	0	19	16.9
FPLSD	ns	8.9	1.4	0.4	3	13	1	6	7

Table 10. Effect of dimethenamid-P on parsley and parsnip growth and yield.

Treatment	Parsley					Parsnips					
	Stand (3 WAP)	Stunting (3 WAP)	Phyto-Toxicity (3 WAP)		Est. growth reduction (8 WAP)	Stand (3 WAP)	Stunting (3 WAP)	Phyto-Toxicity (3 WAP)		Plants surviving (8 WAP)	Est. growth reduction (8 WAP)
	no/5 ft	*%*	*obs.*	*0-10*	*%*	*no/5 ft*	*%*	*Obs.*	*0-10*	*no./5 ft*	*%*
1	11	33	*4*	0	70	2	65	*3*	0	2	61
2	0	100	*0*[a]	-	100	0	99	*1*	0	0.1	100
3	26	15	*4*	1	81	6	0	*3*	0	4	25
4	28	23	*4*	1	76	9	0	*4*	0	4	20
5	5	84	*3*	0	100	3	66	*3*	0	0.7	95
6	1	95	*1*	0	100	0	100	*0*	-	0	100
7	40	0	*4*	0	0	8	0	*4*	0	4	20
FPLSD	15	23	ns		27	4	23	ns		2	28

[a] insufficient survival to make rating

Table 11. Effect of dimethenamid-P on turnip and rutabaga growth and yield.

Treatment	Turnips						Rutabagas					
	Stand	Stunting	Phyto	Harvest (7 WAP)			Stand	Stunting	Phyto	Harvest (7 WAP)		
	(3 WAP)	(3 WAP)	(3 WAP)	No. roots	Root yield	Avg. root wt.	(3 WAP)	(3 WAP)	(3 WAP)	No. roots	Root yield	Avg. root wt.
	no./6 ft	*%*	*0-10*	*no./5 ft*	*t/A*	*lbs*	*no./6 ft*	*%*	*0-10*	*no./5 ft*	*t/A*	*lbs*
1	13	3	0	11	15.3	0.49	18	23	0	15	25.6	0.54
2	12	18	0	8	12.0	0.46	12	68	3	7	18.6	0.81
3	15	10	0	9	13.6	0.45	18	18	1	14	22.0	0.49
4	12	30	1	9	12.8	0.45	16	43	3	12	19.8	0.52
5	14	5	0	9	12.5	0.43	16	35	1	11	17.6	0.49
6	12	20	0	9	10.0	0.37	12	68	4	8	14.9	0.55
7	13	0	0	10	18.4	0.59	17	0	0	12	30.6	0.76
8	14	0	0	9	14.1	0.48	20	5	0	13	28.6	0.69
FPLSD	ns	14	ns	ns	3.6	ns	5	14	1	4	5.9	ns

Table 12. Effect of dimethenamid-P on growth and yield of bunching onions.

Treatment	Stand (3 WAP)	Stunting (3 WAP	Phyto-Toxicity (3 WAP)	Harvest (9 WAP) Plants harvested	Wt	Avg. root wt.
	no/5 ft	%	0-10	no/5 ft	lbs/5ft of row	oz
1	44	0	0	58	2.4	0.7
2	13	20	0	16	0.7	0.6
3	27	0	0	28	1.1	0.6
4	20	0	1	30	1.0	0.5
5	38	8	0	49	2.0	0.7
6	29	13	1	26	0.9	0.5
7	21	0	0	27	1.1	0.6
$FPLSD_{(0.10)}$	23	18	ns	32	1.2	ns

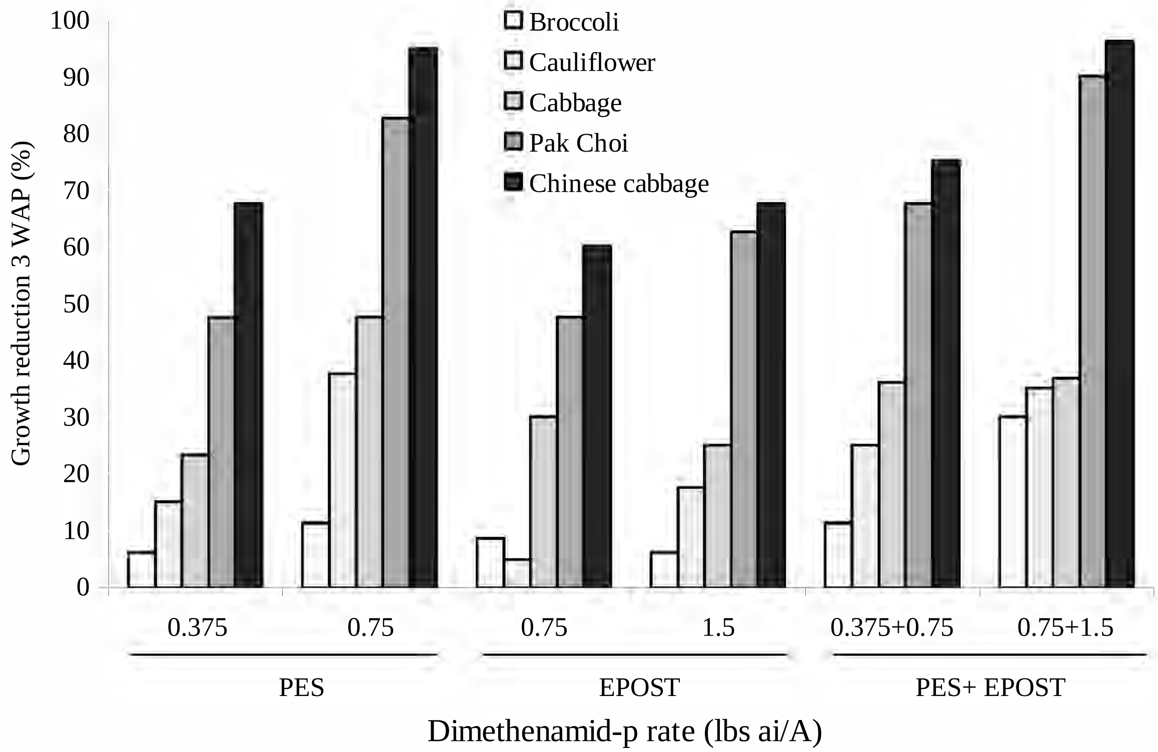

Figure 1. Effect of dimethenamid-p on early season growth of Brassica crops.

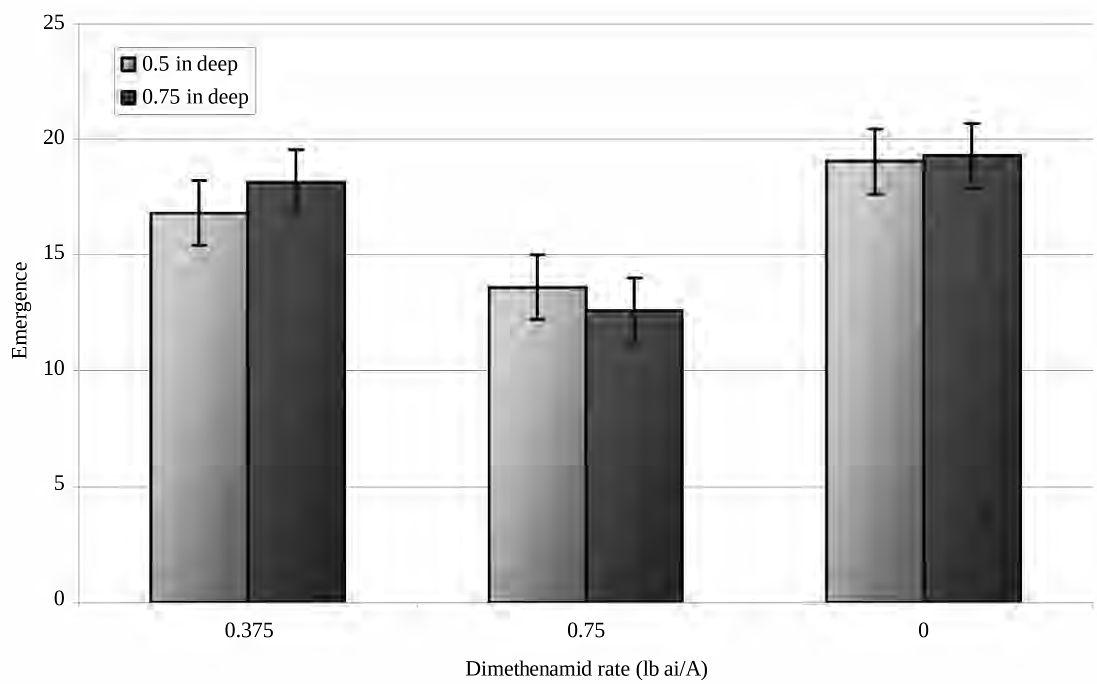

Figure 2. Effect of planting depth on Brassica emergence when averaged over all 5 varieties. P= 0.10 for treatment x depth; p=0.85 for variety x treat x depth effect (n=20 for each data point).

STRAWBERRIES

Evaluation of Selected Post-emergence Herbicides for Use in Newly Established Strawberries.

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Introduction

A study was established in newly planted 'Totem' strawberry to evaluate plant tolerance to the following herbicides applied over the top of strawberry plants 70 days after planting: desmedipham + phenmedipham (Betamix); flucarbazone-sodium (Everest); and V10142.

Methods

Strawberry plants were established on a Quatama silt loam soil with 4% organic matter at the North Willamette Research and Extension Center (NWREC) on June 15, 2005. Treatments were applied on August 23, 2005 using a CO2 pressurized backpack sprayer with a 4-nozzle boom (TeeJet 8002 flat fan) set at 40 psi and a rate of 30 gallons of spray per acre. Plots 4 rows wide (13.3 feet) by 25 feet long were arranged in a randomized complete block design with four replications. A non-ionic surfactant (Preference at 0.25% v/v) was added to the flucarbazone-sodium and V10142. Plants were visually rated for signs of phytotoxicity on August 30 and September 23, 2005. Plant growth measurements were taken from four plants per plot on October 7, 2005.

Results

There was very little damage from desmedipham+phenmedipham on 8/30 (an occasional red spot on leaves) and no visible damage on 9/26/05. Flucarbazone-sodium and V10142 caused considerable damage soon after application, causing new leaves to be yellowish in color, often with red veins and leaf margins. Even mature, fully expanded leaves had some reddening of veins and leaf margins on 8/30/05. By the 9/26 evaluation date, plants treated with V10142 had begun to look better, with young leaves turning green and beginning to expand. However, plants treated with flucarbazone-sodium showed no sign of improvement, with leaves severely stunted and discolored.

Discussion

There were significantly more leaves on plants treated with desmedipham+ phenmedipham or V10142 than on plants treated with flucarbazone-sodium. There were significantly more runners on plants treated with desmedipham+ phenmedipham or in the untreated control than on plants treated with flucarbazone-sodium or V10142. In addition to having more runners, runners present were also healthy and pegging normally in plots treated with desmedipham + phenmedipham. Runners in plots treated with flucarbazone-sodium or V10142 were often darkly discolored with small, yellowish colored leaves and poor pegging. There were no differences among treatments in overall size of plants.

Effect on weeds present at the time of application was also noted on the 8/30/05 evaluation date. Desmedipham + phenmedipham caused a yellowing on leaves of small pigweed, shepherdspurse, and seedling common dandelion plants. It had no effect on pineapple weed, false dandelion, groundsel, vetch, Canada thistle, or established common dandelion plants. Flucarbazone-sodium caused a yellowing on leaves of small sowthistle and common dandelion seedlings. It had no effect on groundsel, annual bluegrass, or established sowthistle or common dandelion plants. V10142 caused a yellowing on leaves of small seedling pigweed, sowthistle, shepherdspurse, and common dandelion plants. It had no effect on annual bluegrass, crabgrass, groundsel, vetch, black medic, or Canada thistle.

A mixture of simazine + napropamide was applied to all plots on October 6, 2005 (standard grower practice). Treatments will be applied to additional rows of strawberries in early spring, 2006 in order to compare effect on strawberry plant growth from a summer (August) versus early spring (March, before new growth has begun) application. Plant growth will be monitored during spring and yield data will be collected from a 5-foot length of row per plot in June, 2006.

Table 1. Phytotoxicity ratings of herbicides applied 10 weeks after planting.

Treatment	Rate lbai/A	Phytotoxicity rating [1] 8/30/05	Phytotoxicity rating [1] 9/26/05
Desmedipham+phenmedipham	0.4875	0.3	0
Flucarbazone-sodium	0.033	3.0	3.4
V10142	0.10	3.2	2.0
Untreated control	-----	0	0
LSD (0.05)		0.36	0.22

[1] *Phytotoxicity ratings are based on a scale of 0-5 with 0= no damage and 5= dead.*

Table 2. Strawberry plant growth measurements, 10/7/05.

Treatment	Number of leaves	Number of runners	Plant diameter Cm
Desmedipham+phenmedipham	13.75	7.88	31.60
Flucarbazone-sodium	8.88	3.19	28.50
V10142	13.00	2.62	26.52
Untreated control	12.62	6.78	31.90
LSD (0.05)	3.74	2.07	Ns

Weed Control Strategies in Second Year Strawberries

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Introduction

This is the second year of a study evaluating quality of weed control and effect on strawberry plant growth from selected herbicides and/or cultural practices.

Methods

A planting of 'Totem' strawberries was established on May 23, 2003 in a Quatama silt loam soil with 4% organic matter at the North Willamette Research and Extension Center (NWREC). Plots 4 rows wide (13.3 feet) by 25 feet long were arranged in a randomized complete block design with four replications. Herbicides were applied using a CO_2 pressurized backpack sprayer with a 4-nozzle boom (TeeJet 8002, flat fan) set at 40 psi and a rate of 20 gallons of spray per acre.

Second year treatments began at renovation (July 16, 2004) and continued in fall (October 5, 2004) through winter (January 5, 2005). The main objective was to evaluate the effect of renovation treatments on weed control and yield in the second fruiting year. Fall treatments consisted of either simazine (grower standard) or metolachlor. All plots were treated with sulfentrazone + napropamide (grower standard) in winter, with the exception of those plots in which the effect of runners over fall and winter were evaluated for weed control and organically managed plots. Fruit was picked twice in June from a 5-foot length of row per plot. Quality of weed control from treatment sequences was evaluated on April 11 and June 21, 2005.

Results

A report of first year yield and weed control data appears in WSWS Research Progress Reports, 2005. In summary, a winter application of the following herbicides resulted in similar first year yields: metolachlor; dimethenamid-P; rimsulfuron; and sulfentrazone + dimethenamid-P. The only winter-applied herbicide that reduced yield was imazapic, which caused considerable damage. Yields were highest in the organic plots (bark mulch applied for weed control) and plots treated with sulfentrazone in which runners were removed in the fall (grower standard practice). Although the presence of runners throughout fall and winter resulted in excellent weed suppression, this practice reduced yields. Unfortunately, first year yield data was skewed by an unexpected infection of leather rot, which affected all plots except those managed organically.

Discussion

Overall weed control was excellent (90-100%) across all treatments on April 11, 2005, but had decreased to some extent by the June 21 evaluation date. However, overall weed control remained excellent in the terbacil/metolachlor/s+d and organic treatments. Overall weed control was good (80-89%) in plots treated with metolachlor/simazine/s+d and sulfentrazone+ napropamide + runners/metolachlor/nothing, and fair (70-79%) in plots treated with rimsulfuron/simazine/s+d, sulfentrazone+napropamide – runners/metolachlor/nothing, and imazapic/simazine/s+d.

Bark mulch, applied to a depth of 5-6 inches in the organically managed plots in October, 2003, continued to provide excellent control of annual weeds through harvest, 2005. However, crabgrass was beginning to grow through the mulch at the time of the June weed evaluation. The mulch was not effective against dock or Canada thistle (removed by hand). However, the mulch provided good control of common dandelion.

The highest marketable yields were in plots treated at renovation, 2004 with metolachlor, rimsulfuron, sulfentrazone+napropamide – runners, and in the weedy control. Marketable yields in plots treated at renovation with imazapic and organically managed plots were comparable to those in the highest yielding plots in the statistically analyzed treatments. Fruit size was smaller than expected across all treatments. There were no differences in adjusted berry size among treatments in the statistically analyzed plots.

Table 1. Treatments and herbicide rates.

Treatment	Rate
Renovation/Fall/Winter	(lb ai/A)
Terbacil/Metolachlor/Sulfentrazone+Napropamide (S+D)	0.3/1.0/0.1875+2.0
Metolachlor/Simazine/S+D	1.0/1.0/0.1875+2.0
Rimsulfuron/Simazine/S+D	0.0156/1.0/0.1875+2.0
S+D+runners/Metolachlor/nothing [1]	0.1875+2.0/1.0/nothing
S+D - runners/Metolachlor/nothing	0.1875+2.0/1.0/nothing
Weeded control	-----
Weedy control	-----
Imazapic/Simazine/S+D [2]	0.062/1.0/0.1875+2.0
Organic [2]	------

[1] Plots treated with sulfentrazone+napropamide at renovation were divided into two different cultural practices: runners removed/tucked into the berry row (- runners); runners allowed to fill in the area between rows (+ runners).
[2] Plots treated with imazapic at renovation and plots managed organically were beside blocked plots and, therefore, not within the experimental design.

Table 2. Overall weed control, expressed as percent control compared to weedy check plots.

Treatment	April 11, 2005 [1]	June 12, 2005 [2]
Terbacil/Metolachlor/S+D	98.8	90.0
Metolachlor/Simazine.S+D	97.5	81.2
Rimsulfuron/Simazine/S+D	100	73.8
S+D+runners/Metolachlor/nothing	98.8	82.0
S+D – runners/Metolachlor/nothing	97.5	70.0
LSD (0.05)	ns	ns
Imazapic/Simazine/S+D	97.5	79.2
Organic	97.5	92.0

[1]Primary weeds present April 11, 2005: annual bluegrass; groundsel; shepherdspurse; sowthistle; prickly lettuce; dandelion; black medic.
[2]Primary weeds present June 12, 2005: groundsel; sowthistle; crabgrass; hawksbeard; barnyardgrass; prickly lettuce; scarlet pimpernel; vetch; dandelion; black medic.

Table 3. Yield data, June, 2005.

Treatment	Total marketable yield	Adjusted berry size
	grams	grams
Terbacil/Metolachlor/S+D	1,809	6.67
Metolachlor/Simazine/S+D	2,034	7.32
Rimsulfuron/Simazine/S+D	2,356	7.16
S+D+runners/Metolachlor/nothing	1,272	7.18
S+D-runners/Metolachlor/nothing	2,362	7.70
Hand weeded control	1,807	7.04
Weedy control	2,162	7.10
LSD (0.05)	495.99	ns
Imazapic/Simazine/S+D	2,036	5.79
Organic	2,078	8.50

MARION BLACKBERRIES

Evaluation of Rimsulfuron as a Potential Herbicide for Marion Blackberries

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Introduction

A study was established in a three year old planting of 'Marion' blackberry to examine the effect of three rates of rimsulfuron applied pre-emergence in early spring on blackberry plant growth and vigor.

Methods

Treatments were applied on April 9, 2005 to a 5-foot swath along the base of the berry plants using a CO_2 pressurized backpack sprayer set at 40 psi. Plots 30 feet long by 10 feet wide (5 plants) were arranged in a randomized complete block design with four replications. Because some primocanes were present at the time of application, effect on primocane growth was monitored during the growing season. However, because primocane burn-back was not the objective of this trial, no adjuvant was added to treatments. Primocane growth was measured on May 13 and June 7, 2005. Final cane measurements were taken on August 15, 2005 prior to training primocanes to the wire. Measurements are based on three plants per plot. The soil is a Quatama silt loam soil with 4% organic matter.

Results

There were no signs of damage to fruiting canes from any rate of rimsulfuron. At the middle and high rates, rimsulfuron caused a slight burn along the margins of primocane leaves, but no apparent damage to the primocanes themselves. Although there was no actual burn back of primocanes from any rate of rimsulfuron, primocane growth in plots treated with rimsulfuron was significantly less on May 13 and June 7, 2005 than in plots treated with the diuron + napropamide standard.

Discussion

There were significantly more canes in plots treated with rimsulfuron than in plots treated with the diuron + napropamide standard. There was more total cane growth in plots treated with diuron + napropamide than in plots treated with the high rate of rimsulfuron. Mean cane height (total cane growth/mean number of canes) was significantly greater in plots treated with diuron + napropamide than in any rimsulfuron plots. However, cane diameter was greater in the diuron + napropamide plots. It is interesting to note that, even though rimsulfuron did not burn back existing primocanes, it held back subsequent primocane growth in a way similar to typical cane-burning products (carfentrazone-ethyl or oxyfluorfen) and resulted in a similar pattern of increased cane number and decreased cane height and diameter. Weed control was excellent (90-100%) in all treatments through mid-August.

Table 1. Primocane height.

Treatment	Rate	Mean primocane height May 13, 2005	Mean primocane height June 7, 2005
	lb ai/A	inches	inches
Rimsulfuron	0.0156	8.25	31.5
Rimsulfuron	0.0312	7.12	25.5
Rimsulfuron	0.0624	7.12	16.9
Diuron + napropamide (grower standard)	2 + 2	46.5	73.5
LSD (0.05)		6.04	6.72

Table 2. Primocane growth measurements,

Treatment	Total number of canes/3 plants	Mean number of canes	Total cane growth	Mean cane height	Cane diameter
			feet	feet	mm
Rimsulf 0.0156	25.5	8.5	113.5	13.4	10.6
Rimsulf 0.0312	26.5	8.8	99.6	11.3	10.6
Rimsulf 0.0624	25.2	8.4	91.8	10.9	10.8
Diuron+Naprop	14.2	4.8	115.8	24.4	12.2
LSD (0.05)	6.98	2.33	23.42	4.17	1.13

CARRY-OVER STUDIES

Rotational Onion Crop Tolerance to Steadfast or Accent Herbicide Applied to Field Corn

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Introduction

Evaluate the tolerance of rotational onion crop to Steadfast (nicosulfuron + rimsulfuron) or Accent (nicosulfuron) herbicides applied post-emergence to field corn.

Methods

The plot area, an Adkins fine-loamy sand, pH 6.9, 0.8% OM, was disked twice on Apr 8, 2004. Fertilizer (75N-46P2O5-30K2O-20S-4Cu-3Zn-1½B) was broadcast on Apr 12. The area was disked twice, cultipacked, and 'Croplan 184RR PP' field corn planted on May 10. Each plot consisted of 4-30' rows, spaced at 30", with 5.5" between seeds (37,400 plants/acre). Steadfast was applied at 0.75, 1.5, and 3.0 oz product/a and Accent at 0.67, 1.34 and 2.68 oz/a on Jun 15 (Table 1). All herbicides were applied using a tractor-mounted boom sprayer, with XR8002VS spray nozzles spaced at 20 inches, at 40 psi in 30 gpa water, 2 mph, and R-11 non-ionic surfactant at 0.25% v/v. Additional weed control was obtained by application of glyphosate as needed throughout the growing season. The crop was grown under center-pivot irrigation, following normal commercial production practices. The field corn crop was harvested on Sep 16, and residue removed from the field.

'BGS 196' yellow storage onion was planted on Apr 13, 2005, 10 months following treatment application to field corn. Two beds/plot, with 4 rows/bed, were seeded 3" between rows, 4¼" between seed (130,000 plants/acre) with a Monosem vacuum planter. Onions emerged on Apr 26. Normal commercial production practices were followed. The interior 10'of each 30' plot was harvested on Aug 19. Onions were sized and graded according to USDA grade standards, counted and weighed.

The experimental design was a randomized complete block, with four replications. Data were computer-analyzed, using the General Linear Models procedure of SAS (SAS Institute, Cary, N.C.). Single degree-of-freedom orthogonal contrasts were performed to compare Accent vs Check, Steadfast vs Check, Accent vs Steadfast, and to test for linear rate responses to Steadfast and Accent.

Results

Herbicide treatments applied to field corn 10 months prior to onions did not affect the number or weight of onions in any size category as compared to the untreated Check (Table 1). Orthogonal contrasts also did not reveal any deleterious effect of the previous season herbicide applications. These results are similar to those obtained in an identical trial conducted in 2003-2004 (data not shown). In that trial, however, onion yields were reduced to unacceptable levels in all plots by excessive yellow nutsedge growth, and subsequent attempts to control the nutsedge.

Application rates in each trial included treatments at 2X (Accent) and 4X (Steadfast) the recommended label rates.

Discussion

These data indicate that there is not a residue or carry-over problem for bulb onions planted ten months following application of either Accent or Steadfast herbicide to field corn at the recommended label rates.

Table 1. Conditions at treatment application, 2004.

Crop:	Field corn, 10-12" height
Date:	Jun 15
Wind:	Calm
Sunlight:	Bright
Time:	10:00-11:30 AM
Air Temp:	65°F
Weeds present:	None
Irrigation:	0.25"

Table 2. Rotational onion crop plot yield as affected by herbicide application to previous-season field corn crop, HAREC, 2005.

	Cull		Under		Medium		Jumbo		Colossal	
Treatment-oz/a	No	Wt[1]	No	Wt	No	Wt	No	Wt	No	Wt
Steadfast-0.75	0	0	1.5	0.2	21.5	7.7 c	56.5	40.7	12.5	13.2
Steadfast-1.50	0.3	0.1	4.8	0.6	31.0	12.2abc	64.5	49.0	10.8	11.6
Steadfast-3.00	0	0	6.0	0.8	39.5	15.5a	50.3	37.3	7.8	8.2
Accent-0.67	0.8	0.3	4.0	0.5	35.8	14.6ab	65.0	47.4	8.5	8.6
Accent-1.34	0.5	0.2	4.8	0.6	29.5	11.3abc	61.8	41.2	11.0	11.4
Accent-2.68	0.3	0.1	2.8	0.4	27.0	10.1 bc	62.5	45.3	8.5	9.2
Check	0.3	0.1	3.3	0.5	32.0	12.3abc	61.0	44.7	5.3	5.6
	NS	NS	NS	NS	NS	*	NS	NS	NS	NS
Contrasts										
Steadfast vs Check	NS	NS	NS	NS	NS	NS	NS	NS	*	*
Steadfast linear	NS	NS	*	NS	NS	*	NS	NS	NS	NS
Accent vs Check	NS	NS	NS	NS	NS	NS	NS	NS	*	NS
Accent linear	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Accent vs Steadfast	*	*	NS	NS	NS	NS	NS	NS	NS	NS

[1] Wt in pounds/plot.

[NS, *] Treatment effect not significant or significant at $P \leq 0.05$. Means followed by different letters are significantly different at P=0.05 (Duncan's multiple range test).

Effect of Impact Herbicide on Rotational Crops after Sweet Corn

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Introduction

To determine the effect of Impact herbicide on rotational crops planted the season after corn. The rotational crops included Crimson clover, perennial ryegrass, forage fescue, processing squash (Golden Delicious), snap beans (OR91G), sugar beets, and Chinese cabbage (B*rassica rapa* Pekinensis).

Methods

The experimental design for the experiment was a strip plot, with herbicide rate, follow-crop, and planting season as the subplots. Four varieties of sweet corn were planted in Corvallis on May 19 in rows 2.5 ft apart. All plots were replicated 4 times. Impact herbicide was applied to subplots within the sweet corn planting on June 28 at 0.016 and 0.032 lbs ai/A, with one of the subplots of each replicate block not receiving any herbicide. The two herbicide treatments were applied with a back pack sprayer with a 10 ft boom with 15 GPA of water. A few sunflowers were seeded with the corn as an indicator crop, and the solution that remained after the application was measured to ensure that the intended rate was applied. Soil analysis is in process.

Following corn harvest on September 11, 2006 the plots were prepared for planting by immediately flailing the corn as close to the soil surface as possible, disking (2x), and rototilling with a vertical tine tiller (2X with Rotera). The residue was allowed to decompose for 9 days to facilitate planting. Crimson clover, perennial ryegrass, forage fescue, processing squash (Golden Delicious), snap beans (OR91G), sugar beets, and Chinese cabbage were planted on September 20, 85 days after Impact herbicide was applied to the corn. Pyramin was applied to the beets and Devrinol to the Chinese cabbage PES to minimize winter weed competition with the crop. Irrigation was needed to establish the crops. Emerged crop seedlings were counted on Oct. 13, 23 days after the crops were seeded, and growth and phytotoxicity rated 6 WAP.

Results

There was no evidence of growth reduction or phytotoxicity for any of the crops at 6 WAP (Figure 1). Snap bean and sugar beet emergence counts were slightly reduced in plots with the 2X rate of Impact. Evaluations in the spring of 2007 indicated that clover biomass may have been reduced by Impact herbicide applied in 2006.

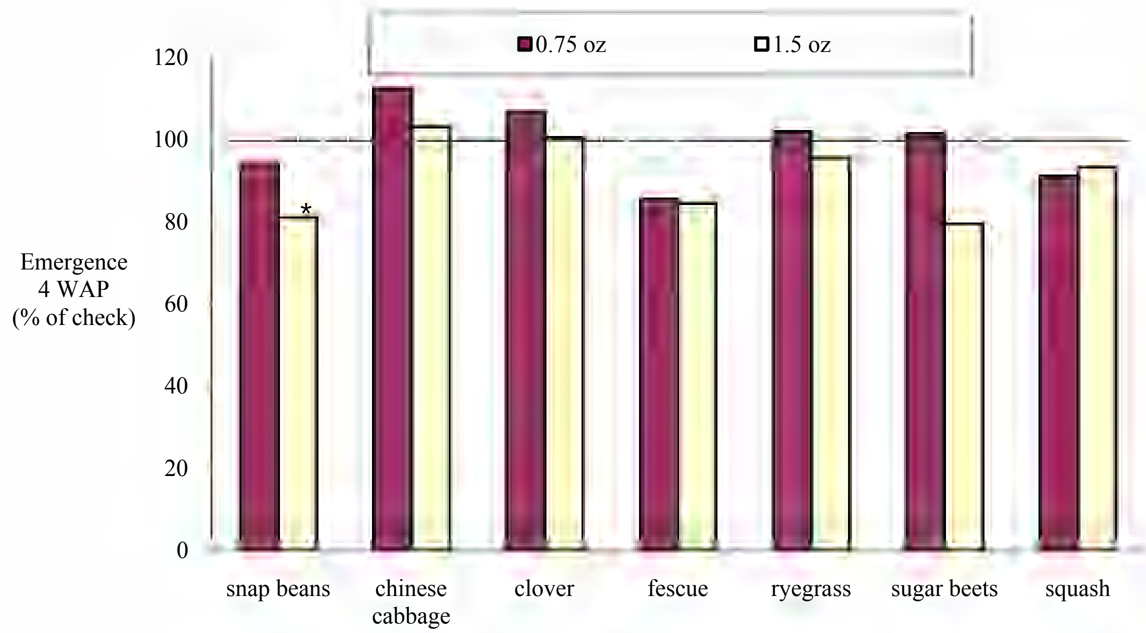

Figure 1. Effect of Impact herbicide on rotational crops planted 82 days after Impact herbicide was applied to sweet corn, Corvallis, 2006. The asterisk (*) indicates that snap bean emergence may have been lower compared to the untreated check when Impact was applied at 1.5 oz in June.