

# EFFECT OF SOIL-HERBICIDES ON OAT COVER CROP AND WATERHEMP IN ROUNDUP READY® SUGARBEET AT HERMAN, MN IN 2013

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The objective of this study was to evaluate soil-herbicides on cover crop establishment, waterhemp control, and sugarbeet yield and quality.

## MATERIALS AND METHODS

Urea fertilizer was applied at 143 lbs/A and incorporated with a Kongskilde ‘s-tine’ field cultivator equipped with rolling baskets on May 10, 2013. ‘Souris’ oat was broadcast with a 3-point mounted rotary spreader perpendicular to sugarbeet rows and incorporated with the Kongskilde field cultivator on May 13. ‘Crystal 875RR’ sugarbeet was seeded 1.25 inches deep in 22 inch rows at 60,825 seeds per acre also on May 13. Sugarbeet was treated with Tachigaren and Poncho Beta at 45 grams and 5.07 fl oz of product, respectively, per 100,000 seeds. Counter 15G insecticide at 6 pounds product per acre was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 13, June 6 & 27, and July 10. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO<sub>2</sub> at 40 psi to the center four rows of six row plots 30 feet in length. Cercospora leaf spot was controlled with Proline at 5.7 fl oz/A, Inspire XT + Topsin at 7 + 10 fl oz/A, and Headline at 9 fl oz/A broadcast July 18, August 13 and 19, respectively. Sugarbeet was harvested September 18 from the center two rows of each plot and weighed. Twenty to thirty pounds of sugarbeet was collected from each plot and analyzed for quality at American Crystal Sugar Quality Lab, East Grand Forks, MN.

Oat stand was counted and height was measured in the center two rows of plots on June 5. Sugarbeet injury was evaluated on June 27. Waterhemp control was evaluated on June 27, July 23, August 6, and September 5. All evaluations were a visual estimate of percent fresh weight reduction in the four treated rows compared to the adjacent untreated strip. Sugarbeet stand was counted on September 18. Experimental design was randomized complete block with 4 replications. Data were analyzed with the ANOVA procedure of Agriculture Research Manager, version 8.5.0 software package.

**Table 1. Application Information**

Application code	A	B	D	D
Date	May 13	June 6	June 27	July 10
Time of Day	5:00 P	12:30 P	11:45 A	11:35 A
Air Temperature (F)	91	61	81	73
Relative Humidity (%)	25	58	45	48
Wind Velocity (mph)	10	6	10	4
Wind Direction	WSW	NE	NW	NW
Soil Temp. (F at 6")	58	55	76	72
Soil Moisture	Fair	Good	Good	Good
Cloud Cover	50	100	5	5
Sugarbeet stage (avg)	PRE	cot-2 lf	12 lf	16 lf
Oat	-	2 lf – 1 tiller	-	-
Waterhemp (untreated avg)	-	cot – 1 lf	5 lf	22 inch

## SUMMARY

Preemergence (PRE) applications of Dual Magnum (s-metolachlor; 7.62 lbai/gal) at 1 pt/A and Ethofumesate 43C (ethofumesate; 4 lbai/gal) at 3 and 7 pt/A followed by three applications of Roundup PowerMax (glyphosate; 4.5 lbae/gal) significantly improved waterhemp control compared to three applications of PowerMax. Three applications of PowerMax gave 83% waterhemp control at the September 5 evaluation when averaged across all oat seeding rates; this suggests the presence of glyphosate-resistant waterhemp at this location. Waterhemp control on September 5 from PowerMax was greater under the 3 bushel/Acre oat seeding rate than when no oat cover crop was sown. This suggests the oat cover crop either reduced waterhemp emergence or increased the sensitivity of waterhemp to glyphosate.

Oat response to the soil herbicides varied by herbicide. There was no difference in oat stand from PRE Dual Magnum compared to the no soil herbicide treatment for either oat seeding rate. Oat height was reduced but the reduction was minimal. This indicates great cover crop safety and the best option, of those tested, for applying a soil herbicide to sugarbeet in the presence of oat cover crop. Preemergence Ethofumesate significantly reduced oat stand and oat height at both rates tested and at both oat seeding rates. Ethofumesate at 3 pt/A reduced the 1 bu/A oat stand by about 20% and the 3 bu/A oat stand by about 40%. This reduction, however, appeared minimal enough to allow a satisfactory amount of cover crop to remain and protect sugarbeet seedlings. The 7pt/A rate of Ethofumesate was reduced oat stand and height at both rates to a point that the cover crop no longer provided any benefit to the sugarbeet crop.

Sugarbeet injury was observed June 27 from PRE Dual Magnum that was greater than the no soil herbicide treatments for each oat seeding rate. Injury severity tended to increase as oat seeding rate increased. The injury level may have been magnified due to the competition of the cover crop on the sugarbeet. Either way, no significant difference in sugarbeet yield or quality was observed among treatments at harvest.

**Table 2. Effect of Soil-Herbicides on Oat Cover Crop and Waterhemp in Roundup Ready® Sugarbeet – Herman, MN – 2013 (Carlson)**

Trt No	Treatment Name	Rate	Appl Code	June 5		June 27		Jul 23	Aug 6	Sept 5	September 18			
				oat count #/¼ m <sup>2</sup>	oat ht in	sgbt inj	wahe cntl	wahe cntl	wahe cntl	sgbt stnd #/100'	sgbt yield ton/a	sgbt suc %	sgbt ext lb/a	
<b>Oat 0 bu/a</b>														
1	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D	0	0	0	64	88	88	80	218	28.9	16.8	8976
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
2	Dual Magnum	1 pt/a	A	0	0	3	96	99	99	98	216	29.6	17.1	9436
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
3	Ethofumesate	3 pt/a	A	0	0	0	96	100	100	98	214	28.6	16.6	8885
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
4	Ethofumesate	7 pt/a	A	0	0	0	100	100	100	100	207	29.5	16.8	9145
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
<b>Oat 1 bu/a</b>														
5	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D	28	3.5	1	70	88	90	83	220	26.8	17.0	8502
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
6	Dual Magnum	1 pt/a	A	31	3.3	5	98	100	100	100	209	28.7	16.6	8805
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
7	Ethofumesate	3 pt/a	A	22	2.1	0	94	100	100	99	221	29.8	16.6	9216
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
8	Ethofumesate	7 pt/a	A	12	1.2	0	99	99	99	100	217	29.7	16.3	9004
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
<b>Oat 3 bu/a</b>														
9	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D	81	3.8	2	76	94	92	87	212	28.6	16.5	8839
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
10	Dual Magnum	1 pt/a	A	81	3.4	9	98	99	99	99	201	30.6	17.0	9676
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
11	Ethofumesate	3 pt/a	A	48	2.1	0	96	99	100	99	212	28.9	16.7	8963
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
12	Ethofumesate	7 pt/a	A	23	1.5	2	100	100	100	100	216	29.7	16.7	9195
	RU PowerMax	32 / 24 / 22 fl oz/a	B/C/D											
	N Pak AMS	2.5 % v/v	BCD											
	NIS	0.25 % v/v	BCD											
<b>LSD 5%</b>				<b>12.3</b>	<b>0.24</b>	<b>2.7</b>	<b>9.4</b>	<b>3.9</b>	<b>4.5</b>	<b>5.6</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>	<b>NS</b>
<b>CV%</b>				<b>31</b>	<b>9</b>	<b>107</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>2</b>	<b>8</b>