EFFECT OF SOIL-HERBICIDES ON OAT COVER CROP AND ROUNDUP READY® SUGARBEET AT PROSPER, ND IN 2013

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

MATERIALS AND METHODS

'Souris' oat was broadcast with a 3-point mounted rotary spreader perpendicular to sugarbeet rows and incorporated with a 'c-tine' field cultivator equipped with a spring-tooth harrow on May 24. 'SES 36917RR' sugarbeet was seeded 1.25 inches deep in 22 inch rows at 60,825 seeds per acre also on May 24. Sugarbeet was treated with Tachigaren at 45 grams per 100,000 seeds and NipsIT Suite. Counter 20G insecticide at 8.9 pounds product per acre was applied in a 5-inch band and drag chain incorporated at planting. Herbicide treatments were applied May 24, June 19, and July 3 & 16. All treatments were applied with a bicycle sprayer in 17 gpa spray solution through 8002 XR flat fan nozzles pressurized with CO_2 at 40 psi to the center four rows of six row plots 30 feet in length. Quadris was broadcast at 16 fl oz/A June 13 to prevent Rhizoctonia root rot. Cercospora leaf spot was controlled with Proline at 5.7 fl oz/A and Headline EC at 9 fl oz/A broadcast July 29 and August 19, respectively. Sugarbeet was harvested September 25 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, height measured, and visual injury evaluated on June 19. Sugarbeet injury was evaluated on June 19 and July 30. Redroot pigweed control was evaluated on June 19. 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 25. 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	C	D
Date	May 24	June 19	July 3	July 16
Time of Day	4:00 P	1:00 P	9:45 A	10:00 A
Air Temperature (F)	60	83	79	86
Relative Humidity (%)	53	50	50	70
Wind Velocity (mph)	16	4	2	8
Wind Direction	SW	SE	S	S
Soil Temp. (F at 6")	52	82	75	72
Soil Moisture	Good	Good	Dry	Good
Cloud Cover	100	60	5	65
Sugarbeet stage (avg)	PRE	2-3 lf	8 lf	12 lf
Oat	-	3 lf – 1 tiller	-	-
Redroot pigweed (untreated avg)	-	cot	7 inch	22 inch

SUMMARY

Redroot pigweed control varied by treatment but generally increased as the rate of preemergence (PRE) herbicide increased. Preemerge Dual Magnum (s-metolachlor; 7.62 lbai/gal) at 1 and 1.5 pt/a gave 98% or better pigweed control across all oat seeding rates on June 19. Dual Magnum at 0.5 pt/a gave more variable pigweed control ranging from 86 to 100% depending on oat seeding rate. Preemerge Ethofumesate 4SC (ethofumesate; 4 lbai/gal) showed more variable pigweed control from 3 and 5 pt/a compared to 7 pt/a. Ethofumesate at 7 pt/a PRE gave 98% or better pigweed control across all oat seeding rates on June 19. Roundup PowerMax (glyphosate; 4.5 lbae/gal) effectively controlled all weeds at this location.

Oat response to the soil herbicides varied by herbicide. There was no difference in visual oat injury from PRE Dual Magnum at 1 pt/a or less compared to the no soil herbicide treatment for either oat seeding rate. Dual Magnum at 1.5 pt/a showed only 8% cover crop injury at 3 bu/a oat and 5% at 1 bu/a oats. Oat stand was reduced about 25% by PRE Dual Magnum at all rates tested in the 3 bu/a oat rate, but no difference was detected at the 1 bu/a oat rate. Oat height was not affected by Dual Magnum at any herbicide or oat seeding rate. This indicates great cover crop safety from PRE Dual Magnum. Preemergence

Ethofumesate significantly reduced oat stand and oat height at all rates tested and at both oat seeding rates. Ethofumesate at 3 pt/A reduced the 1 bu/A oat stand by about 35% and the 3 bu/A oat stand by about 50%. This reduction, however, appeared minimal enough to allow a satisfactory amount of cover crop to remain and protect sugarbeet seedlings. Visual estimates of oat injury from Ethofumesate at 5 and 7 pt/a ranged from 76 to 91%. The 5 and 7 pt/A rates of Ethofumesate also reduced oat stand and height to a point that the cover crop no longer provided any benefit to the sugarbeet crop.

Sugarbeet injury was observed June 19 from PRE Dual Magnum at 1.5 pt/a at the 1 and 0 bu/a oat seeding rates as well as at the 1.0 pt/a rate under no oat cover crop. This early season injury was not enough to cause any significant difference in sugarbeet yield or quality among treatments at harvest.

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

					June 19					July 30	September 25			
Trt No	Treatment Name	Rate	Rate Unit	Appl Code	oat count	oat ht	oat inj	rrpw cntl	sgbt inj	sgbt inj	sgbt stand	sgbt yield	sgbt sucr	sgbt ext suc
					#/¼ m^2	in			%----------		#/100'	ton/a	%	lb/a
	Oat	**0**	**bu/a**											
1	RU PowerMax	32 / 24 / 22	fl oz/a	B/C/D	0	0.0	0	0	1	0	210	30.4	15.5	8775
	N Pak AMS	2.5	% v/v	BCD										
	NIS	0.25	% v/v	BCD										
2	Dual Magnum	0.5	pt/a	A	0	0.0	0	86	0	1	212	30.0	16.0	8951
	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	Dual Magnum	1	pt/a	A	0	0.0	0	98	5	1	193	29.0	15.5	8350
	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	Dual Magnum	1.5	pt/a	A	0	0.0	0	100	11	0	193	29.3	15.8	8625
	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										
5	Nortron	3	pt/a	A	0	0.0	0	68	1	1	210	29.8	15.9	8816
	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										
6	Nortron	5	pt/a	A	0	0.0	0	96	3	0	215	29.1	16.0	8694
	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	Nortron	7	pt/a	A	0	0.0	0	99	4	0	206	28.9	15.7	8468
	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										
	Oat	**1**	**bu/a**											
8	RU PowerMax	32 / 24 / 22	fl oz/a	B/C/D	20	4.5	0	0	0	0	207	29.9	15.5	8601
	N Pak AMS	2.5	% v/v	BCD										
	NIS	0.25	% v/v	BCD										
9	Dual Magnum	0.5	pt/a	A	19	5.4	0	82	1	0	199	30.0	14.5	7956
	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										
10	Dual Magnum	1	pt/a	A	18	4.5	3	100	3	0	200	29.5	15.5	8464
	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										

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					#/¼ m^2	in	----------%			----------	#/100'	ton/a	%	lb/a
11	Dual Magnum	1.5	pt/a	A	20	4.4	5	100	8	1	198	29.0	15.4	8203
	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	Nortron	3	pt/a	A	13	4.0	40	84	1	0	215	29.4	15.2	8311
	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										
13	Nortron	5	pt/a	A	4	3.4	87	88	0	0	208	29.0	15.4	8299
	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										
14	Nortron	7	pt/a	A	7	3.3	91	100	1	0	205	29.5	15.7	8611
	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										
	Oat	**3**	**bu/a**											
15	RU PowerMax	32 / 24 / 22	fl oz/a	B/C/D	58	5.1	0	0	0	0	209	26.9	14.9	7295
	N Pak AMS	2.5	% v/v	BCD										
	NIS	0.25	% v/v	BCD										
16	Dual Magnum	0.5	pt/a	A	42	5.8	0	100	1	0	212	28.4	15.3	7971
	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										
17	Dual Magnum	1	pt/a	A	41	5.0	1	100	0	0	212	28.8	15.0	7915
	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										
18	Dual Magnum	1.5	pt/a	A	45	4.8	8	100	4	0	187	28.9	15.8	8460
	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										
19	Nortron	3	pt/a	A	28	3.5	44	70	0	0	210	29.3	15.2	8237
	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										
20	Nortron	5	pt/a	A	22	3.8	76	99	0	0	210	29.1	15.3	8152
	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										
21	Nortron	7	pt/a	A	13	4.0	88	98	1	0	204	28.4	15.4	8049
	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										
	LSD 5%				**6.3**	**0.750**	**5.9**	**15.4**	**4.1**	**NS**	**15.6**	**NS**	**NS**	**NS**
	CV %				**27**	**18**	**20**	**14**	**138**	**462**	**5**	**6**	**4**	**7**