Volunteer Roundup-Ready Corn Control in Roundup-Ready Sugarbeets at Scottsbluff, Nebraska during the 2009 Growing Season.

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A field study was initiated near Scottsbluff, Nebraska to compare the performance of three herbicides applied at two rates, two timings, and with and without crop oil concentrate for volunteer corn control. The experimental design was a randomized complete block with three replications. Plots were 11 feet wide by 25 feet long and were located on a sandy loam soil with a pH of 8.1 and organic matter content of 1.1%. Sugarbeet 'BTS66RR70' were planted on April 24. The plot area was irrigated on April 30, May 8, May 16, and May 20 for seed germination and early season plant growth. Roundup-Ready Corn was planted in each plot during the second week of May. In three rows of each six row plot single kernels of corn were planted in the sugarbeet row every 5 ft, in the other three rows 12 kernels of corn were planted every 5 ft in clumps to simulate a partial ear of corn. Roundup Power Max at 22 oz/acre plus ammonium sulfate (AMS) was applied to the entire plot area when sugarbeets reached the two true-leaf growth stage (May 22). Roundup Power Max at 22 oz/acre was again applied when sugarbeets reached the six true-leaf growth stage (June 9). At this timing selected plots also received a gramaticide in combination with Roundup Power Max for volunteer corn control. A third application of Roundup Power Max at 22 oz/acre was applied at the time of sugarbeet canopy closure which occurred on July 1. Again selected plots received a combination of Roundup plus gramaticide for volunteer corn control. Therefore volunteer corn in half the plots was treated with a gramaticide when sugarbeets were in the six true-leaf stage and half were treated approximately a month later at the time of canopy closure. Another aspect of the experiment was to examine the affect of crop oil concentrate (COC) in combination with Roundup Power Max and the gramaticide for volunteer corn control and potential sugarbeet injury. Herbicides were applied with a tractor- mounted sprayer calibrated to deliver 20 gallons of water per acre at 32-psi pressure with Spraying Systems 11002 VS nozzles. The environmental conditions at the time of spraying are given in Table 1.

Assure, Select Max, and Select provided 88% or greater volunteer corn control when applied at the six true-leaf growth stage (Table 2). Herbicides seemed to work the same with or without the addition of crop oil. As volunteer corn increased in size the effectiveness of the herbicides was reduced. Assure II applied at 6 oz/acre in combination with Roundup Power Max only provided 44% control of individual corn plants and 55% control of clumps of corn. The addition of crop oil concentrate to Assure II plus Roundup Power Max increased volunteer corn control of individual plants and clumps to 96% or more. Increasing the rate of Assure II to 8 oz /acre (no COC) provided 50 and 75% control of individual and clumps of volunteer corn. Again adding crop oil concentrate to Assure II at 8 oz/acre improved volunteer corn control to 97% or more.

A comparison of Assure II, Select Max, and Select all applied at 8 oz/acre, in combination with Roundup Power Max, and without crop oil concentrate, provided 72, 92, and 86% volunteer corn control (average of individual plants and clumps), respectively (Table 2). The addition of crop oil concentrate to Assure II, Select Max, and Select (8 oz/acre) increased volunteer corn control to 98, 97, and 99%, respectively. These results suggest that the addition

of crop oil concentrate to combinations of Assure II, Select Max, or Select in combination with Roundup Power Max are very important when larger corn plants are trying to be suppressed in Roundup-Ready sugarbeets.

Sugarbeet root yields were excellent in the plot area and ranged from 33.4 to 46.5 tons/acre. There were several yield comparisons that suggest there was a benefit in removing volunteer corn. Assure II at 6 oz/acre (no COC) applied at the six true-leaf growth stage provided average volunteer corn control of 97% with a sugarbeet root yield of 39.1 tons/acre, the same treatment applied at canopy closure resulted in 58% volunteer corn control with a sugarbeet root yield of 35.2 tons/acre. A similar comparison with Assure II applied at 8 oz/acre resulted in 97% and 67% volunteer corn control from treatments applied at six true-leaf and canopy closure, respectively, with root yields of 46.5 and 34.0 tons/acre. Yet with other treatments such as Select at 6 oz/acre (no COC) volunteer corn control was 97 and 54% for applications made at the six true-leaf and canopy closure, respectively, but root yields were 40.6 and 43.6 tons/acre which did not reflect a yield reduction because of reduced volunteer corn control from delayed application of Select.

Table 1. Environmental Conditions at the Time of Herbicide Application.

Date	Air temperature	Humidity	Wind speed & direction	Time of day	Sugarbeet growth stage	Volunteer corn height
	(F)	(%)	(mph)			(inches)
May 22	72	50	3 SE	1:00 PM	2 true-leaf	2
June 9	71	47	6 W	11:00 AM	6 true-leaf	8
July 1	66	68	2 SE	9:00 AM	canopy closure	16

Rainfall or irrigation after herbicide application.

Date	Amount
	(inch)
May 22	0.05
May 23	0.01
May 24	0.74
May 25	0.15
May 31	0.42
June 3	0.29
June 7	0.32
June 8	0.16
June 10	1.35
June 11	0.26
June 14	0.63
June 23	0.12
June 26	0.17

Table 2. Volunteer Roundup-Ready Corn Control in Roundup-Ready Sugarbeets.

Treatment[1]	Product rate	Spray additive[2]	Application Timing	Volunteer Corn Control[3]				Sugarbeet				
				Individual plants		Clumps		Visual injury	Stand	Root yield		
				7/22	8/10	7/22	8/10	7/13	7/13	10/7	Sucrose	SLM
	(oz/acre)			%				(%)	(plants/acre)	(tons/acre)	(%)	
Nontreated	--	--	--	0	0	0	0	0	46710	38.5	14.2	1.53
Assure II	6	--	6TL	99	99	98	95	4	44330	39.1	15.3	1.38
Assure II	6	--	canopy close	44	75	55	58	0	45280	35.2	14.2	1.65
Assure II	6	COC	6TL	99	94	98	97	0	42120	36.2	14.0	1.79
Assure II	6	COC	canopy close	94	99	93	96	0	46550	37.6	15.0	1.55
Assure II	8	--	6TL	99	99	97	96	0	43700	46.5	13.4	1.67
Assure II	8	--	canopy close	50	75	75	69	0	42430	34.0	15.2	1.55
Assure II	8	COC	6TL	99	99	95	91	0	42910	35.8	15.1	1.56
Assure II	8	COC	canopy close	75	99	97	97	4	41640	36.8	14.2	1.58
Select Max	8	--	6TL	99	99	89	93	0	45760	37.4	15.2	1.39
Select Max	8	--	canopy close	69	94	90	90	0	45280	36.4	14.2	1.61
Select Max	8	COC	6TL	99	88	97	97	0	44330	38.2	15.1	1.50
Select Max	8	COC	canopy close	81	99	95	96	0	43380	40.9	14.6	1.56
Select Max	12	--	6TL	99	99	96	92	0	44330	42.6	14.3	1.74
Select Max	12	--	canopy close	81	99	95	99	0	44330	38.6	14.8	1.47
Select Max	12	COC	6TL	99	99	97	97	0	41800	33.4	15.2	1.49
Select Max	12	COC	canopy close	81	99	95	99	3	42430	38.0	14.6	1.66
Select	6	--	6TL	99	99	97	98	4	44490	40.6	14.2	1.66
Select	6	--	canopy close	13	50	75	80	0	44490	43.6	14.0	1.61
Select	6	COC	6TL	99	99	99	99	0	41800	39.9	15.1	1.39
Select	6	COC	canopy close	81	94	98	99	0	44020	41.3	14.4	1.50
Select	8	--	6TL	94	99	95	95	0	41800	39.7	14.5	1.51
Select	8	--	canopy close	63	88	87	84	0	39900	35.7	14.2	1.81
Select	8	COC	6TL	94	99	99	99	0	44810	35.7	14.5	1.44
Select	8	COC	canopy close	88	99	97	99	0	43070	38.4	14.2	1.74
LSD at (0.05)	--	--	--	31	10	26	23	NS	NS	8.6	NS	NS

[1]Herbicide treatments all contained Roundup Power Max at 22 oz/acre plus ammonium sulfate (AMS) at 17 lb/100 gallons of spray solution.

[2]The spray additive crop oil concentrate was added at a rate 1% per volume of carrier.

[3]Volunteer corn control was determined by recording corn density before and after herbicide application.