MICHIGAN SUGARBEET REACh
Research Education Advisory Council

2012 Research Results

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MISSION STATEMENT:

The mission of the ***Michigan Sugarbeet Research Education Advisory Council*** is to be the central trusted source of agronomic information for the sugarbeet industry.

The council will provide direction for the Michigan-Ontario sugarbeet researchers and assemble and distribute research/agronomy information.

Cooperative educational efforts will be conducted with the goal of improving productivity and profitability for all stakeholders.

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2012 Research Results

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Rhizoctonia - Evaluate Quadris Rates, Application Timings & T-Band Widths for Rhizoctonia Control Sherwood, Breckenridge, MI - 2012 (page 1 of 3)

Trial Quality: Good
Planted: April 11
Harvested: Nov 3
Plot Size: 6 rows X 50 ft, 4 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Previous Crop: Soy Beans
Other Pests: None
Seasonal Rainfall: 22.0 inches

Cercospora Control: 4 Applic. Good Control
Applic Dates: May 19 and May 28

Average of a Susceptible & a Moderately Tolerant Variety

Trt	Rate fl oz/ Acre	App Time	Band Width Inch	Vigor Rate 0-10	Dead Beets B/100'	Early Stand B/100'	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP
Quadris	19	IF	7	**8.0**	**23**	**187**	**$2,520**	**10773**	**310**	**34.6**	**20.3**	**96.2**
Quadris Quadris	7.1 14.3	IF 8 lf	3.5 7	**7.7**	**20**	**188**	**$2,499**	**10699**	**306**	**34.6**	**20.1**	**96.0**
Quadris Quadris	7.1 14.3	IF 4 lf	3.5 7	**7.5**	**29**	**188**	**$2,434**	**10425**	**317**	**32.8**	**20.8**	**96.2**
Quadris	14.3	IF	7	**7.5**	**26**	**189**	**$2,587**	**11029**	**309**	**35.6**	**20.3**	**96.1**
Quadris	4.8	IF	2	7.3	**27**	**186**	**$2,333**	**9902**	**301**	**32.8**	**20.0**	**95.6**
Quadris	14.3	8 lf	7	7.2	**39**	**189**	**$2,337**	**9970**	**307**	**32.1**	**20.2**	**96.0**
Quadris	7.1	IF	1	7.2	**29**	183	**$2,382**	**10119**	**307**	**32.8**	**20.2**	**96.0**
Quadris	7.1	IF	3.5	7.2	**40**	**185**	**$2,266**	**9631**	**304**	**31.5**	**20.0**	**95.8**
Quadris	7.1	IF	2	7.1	**33**	**187**	**$2,443**	**10377**	**308**	**33.4**	**20.2**	**96.1**
Quadris	4.8	IF	1	7.1	**27**	183	**$2,195**	**9316**	**306**	30.4	**20.1**	**96.2**
Quadris	14.3	4 lf	7	7.1	**37**	**187**	**$2,195**	**9370**	**300**	31.0	**19.8**	**95.9**
Quadris	9.5	IF	3.5	7.0	**28**	184	**$2,285**	**9724**	**302**	**31.7**	**20.0**	**95.7**
Quadris	3.6	IF	1	6.9	**46**	**189**	**$2,138**	9066	**300**	29.8	**19.8**	**96.0**
Quadris	3.6	IF	2	6.6	**42**	**187**	**$2,157**	9146	**295**	30.7	19.6	**95.7**
Untreated				5.6	71	**184**	$1,587	6715	282	23.3	18.9	95.2
Average				7.1	37	186	$2,291	9530	302	31.3	19.9	95.8
LSD 5%				0.6	27.8	5.0	427.7	1809.5	25.0	4.5	1.2	1.0
CV %				5.2	66.3	2.1	8.8	8.7	4.1	6.3	3.1	0.5

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The Vigor Rating column (avg. of 3 ratings) is considered to be the most accurate indicator of Rhizoctonia control. The early stand count was taken on May 26 and the dead beet count is an average of Aug 25 and Sept 10 counts. The trial was not inoculated and the Rhizoctonia level was very high. Higher Quadris rates provided better disease control. T-band applications followed by a foliar treatment at the 8 lf stage, provided good disease control. Cutting Quadris rates in narrow bands reduced disease control. With respect to foliar applications, the 8 lf stage was superior to the 4 lf stage. None of the treatments reduced emergence. C-RR059 held up to the Rhizoc pressure much better than B-17RR32.

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Rhizoctonia - Evaluate Quadris Rates, Application Timings & T-Band Widths for Rhizoctonia Control
Sherwood, Breckenridge, MI - 2012
(page 2 of 3)

Moderately Tolerant Variety - C-RR059

Trt.	Rate fl oz/ Acre	App Time	Band Wide Inch	Vigor Rate 0-10	Dead Beets 100 ft	Early Stand B/100'	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP
Quadris	19	IF	7	**8.9**	**3.3**	**192**	**$2,967**	**12664**	**322**	**39.3**	**21.0**	**96.3**
Quadris	7.1	IF	3.5	**8.6**	**7.7**	**191**	**$2,864**	**12242**	**318**	**38.5**	**20.8**	**96.3**
Quadris	14.3	8 lf	7									
Quadris	7.1	IF	3.5	**8.5**	**9.2**	**193**	**$2,757**	**11790**	**326**	**36.2**	**21.3**	**96.1**
Quadris	14.3	4 lf	7									
Quadris	14.3	IF	7	**8.4**	**9.2**	**194**	**$2,832**	**12065**	**317**	**38.1**	**20.7**	**96.4**
Quadris	3.6	IF	1	**8.3**	**12.2**	**195**	**$2,684**	**11377**	**311**	**36.4**	**20.4**	**96.1**
Quadris	7.1	IF	3.5	**8.2**	**14.5**	187	**$2,679**	**11376**	**314**	**36.2**	**20.6**	**96.0**
Quadris	4.8	IF	2	8.1	**5.7**	186	**$2,674**	**11343**	**306**	**37.2**	**20.2**	**95.7**
Quadris	14.3	4 lf	7	8.1	**9.8**	**190**	**$2,606**	**11110**	**318**	34.9	**20.7**	**96.4**
Quadris	9.5	IF	3.5	7.9	**11.0**	186	**$2,764**	**11749**	**323**	**36.4**	**21.1**	**96.1**
Quadris	14.3	8 lf	7	7.9	**15.0**	**191**	$2,544	10849	**317**	34.2	**20.7**	**96.3**
Quadris	7.1	IF	2	7.8	**15.0**	**192**	**$2,785**	**11823**	**322**	**36.6**	**21.0**	**96.3**
Quadris	3.6	IF	2	7.8	**13.0**	**192**	$2,517	10668	300	35.4	19.9	**95.6**
Quadris	4.8	IF	1	7.8	**9.5**	185	$2,531	10736	**325**	33.0	**21.2**	**96.4**
Quadris	7.1	IF	1	7.4	18.5	184	**$2,672**	**11349**	**317**	**35.9**	**20.7**	**96.2**
Untreated				6.3	39.8	186	$2,072	8767	**313**	28.0	**20.6**	**96.0**
Average				8.0	12.9	190	$2,663	11327	317	35.8	20.7	96.2
LSD 5%				0.7	14.3	6.6	389.8	1649.1	ns(21.7)	3.7	1.1	ns(.9)
CV %				5.2	66.3	2.1	8.8	8.7	4.1	6.3	3.1	0.5

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: There was very high pressure in this field. Even with the moderately resistant variety, higher Quadris rates or two Quadris applications were needed to prevent yield losses.

Rhizoctonia - Evaluate Quadris Rates, Application Timings & T-Band Widths for Rhizoctonia Control Sherwood, Breckenridge, MI - 2012 (page 3 of 3)

Susceptible Variety - B-17RR32

Trt.	Rate fl oz/ Acre	App Time	Band Width Inch	Vigor Rate 0-10	Dead Beets 100'	Early Stand B/100'	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP
Quadris	19	IF	7	**7.0**	**42**	**183**	**$2,073**	**8882**	**298**	**29.9**	**19.6**	**96.1**
Quadris	7.1	IF	1	**6.9**	**39**	**183**	**$2,091**	**8888**	**297**	**29.8**	**19.6**	**95.7**
Quadris Quadris	7.1 14.3	IF 8 lf	3.5 7	**6.9**	**33**	**185**	**$2,134**	**9157**	**294**	**30.7**	**19.5**	**95.7**
Quadris	4.8	IF	2	**6.5**	**49**	**185**	**$1,993**	**8461**	**296**	**28.5**	**19.7**	**95.5**
Quadris Quadris	7.1 14.3	IF 4 lf	3.5 7	**6.5**	**48**	**183**	**$2,111**	**9060**	**309**	**29.3**	**20.2**	**96.3**
Quadris	14.3	IF	7	**6.5**	**43**	**183**	**$2,342**	**9994**	**301**	**33.1**	**19.9**	**95.8**
Quadris	14.3	8 lf	7	**6.5**	**63**	**187**	**$2,129**	**9092**	**298**	**29.9**	**19.7**	**95.7**
Quadris	4.8	IF	1	**6.4**	**45**	**180**	**$1,859**	**7896**	**286**	**27.8**	**18.9**	**95.9**
Quadris	7.1	IF	2	**6.4**	**51**	**183**	**$2,101**	**8931**	**294**	**30.1**	**19.4**	**95.9**
Quadris	9.5	IF	3.5	6.1	**45**	**181**	**$1,807**	**7698**	**281**	**27.0**	**18.8**	**95.3**
Quadris	7.1	IF	3.5	6.1	**66**	**182**	**$1,854**	**7886**	**293**	**26.8**	**19.4**	**95.6**
Quadris	14.3	4 lf	7	6.1	**64**	**184**	**$1,784**	**7631**	**281**	**27.1**	**18.8**	**95.4**
Quadris	3.6	IF	1	5.4	**80**	**182**	$1,592	6755	**289**	23.3	**19.1**	**95.9**
Quadris	3.6	IF	2	5.4	**70**	**182**	**$1,797**	**7623**	**291**	**26.0**	**19.3**	**95.7**
Untreated				4.8	102	**183**	$1,102	4662	250	18.7	17.2	94.4
Average				6.2	56	183	$1,918	8174	291	27.9	19.3	95.7
LSD 5%				0.8	48.1	ns(7.9)	671.4	2840.6	39.8	7.4	2.0	1.5
CV %				7.9	51.3	2.6	20.9	20.8	8.2	15.9	6.2	0.9

Bold: Results are not statistically different from top-ranking treatment.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: There was very high Rhizoctonia pressure at this location. The susceptible variety, B-17RR32, had yield losses of 50% in the untreated plots. High Quadris rates and 2 applications (IF and Foliar) provided marginal disease control.

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Rhizoctonia - Evaluate Moncut (Flutolanil) for Control of Rhizoctonia Root Rot in Sugarbeets Blumfield, MI - 2012 (page 1 of 2)

Trial Quality: Good
Planted: April 13
Harvested: Sept 15
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR824

Soil Info: Clay Loam
2.9% OM, 7.3 pH
Fertility: Fertility levels good
90 lbs of N added
Previous Crop: Soybeans
Other Pests: None
Seasonal Rainfall: 21.9 inches

Cercospora Control: 3 Applic
Good Control
Applic Date: May 22

Treatment	Rate	App & Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead /Plot Aug-22	Vigor 0-10 Sept-5
Quadris	7.1 fl oz/a	IF,3.5	**$2,004**	**8479**	**231**	**36.8**	**15.8**	**94.8**	**0.2**	**8.8**
Quadris Quadris	7.1 fl oz/a 14.3 fl oz/a	IF,3.5 8 lf,7	**$1,928**	**8158**	**227**	**36.0**	**15.7**	**94.6**	**0.3**	**8.9**
Moncut	5.7 oz wt/a	IF,3.5	**$1,909**	**8075**	**228**	**35.5**	**15.6**	**94.8**	**0.3**	8.4
Moncut	17.6 oz wt/a	IF,3.5	$1,871	7915	217	**36.5**	15.2	**94.1**	**1.0**	**8.8**
Moncut	11.4 oz wt/a	8 lf,7	$1,841	7791	**222**	**35.2**	**15.4**	**94.4**	**0.7**	**8.8**
Moncut	8.8 oz wt/a	IF,3.5	$1,819	7698	**225**	34.2	**15.5**	**94.6**	**0.8**	8.5
Moncut Moncut	17.6 oz wt/a 35.2 oz wt/a	IF,3.5 8 lf,7	$1,817	7687	218	**35.3**	15.2	**94.1**	**0.3**	**8.9**
Moncut Moncut	5.7 oz wt/a 11.4 oz wt/a	IF,3.5 8 lf,7	$1,811	7663	218	**35.2**	**15.3**	93.8	**0.5**	8.4
Moncut Moncut	8.8 oz wt/a 17.6 oz wt/a	IF,3.5 8 lf,7	$1,806	7643	**223**	34.3	**15.5**	**94.2**	**0.2**	**8.8**
Moncut	17.6 oz wt/a	8 lf,7	$1,793	7585	**222**	34.2	**15.4**	**94.4**	**2.2**	8.4
Moncut	35.2 oz wt/a	8 lf,7	$1,760	7448	**229**	32.5	**15.8**	**94.5**	**2.0**	8.1
Untreated			$1,748	7395	220	33.6	15.3	**94.3**	**2.3**	6.4
Quadris	14.3 fl oz/a	8 lf,7	$1,726	7301	217	33.6	15.2	94.0	**0.5**	8.3
Average			$1,833	7757	223	34.8	15.5	94.4	0.9	8.4
LSD 5%			121.2	512.9	9.4	2.2	0.5	0.8	ns(2.5)	0.3
CV %			5.7	5.7	3.6	5.6	2.8	0.7	249.6	3.4

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Moncut (flutolanil) is a new systemic fungicide being evaluated for Rhizoctonia root rot control in sugarbeets. Moncut inhibits cell respiration, but has a different mode of action than the Strobilurins. Control in recent years has been similar to Quadris. The disease level was low in this trial and dead beet counts are not meaningful. The Moncut plots had favorable vigor ratings, indicating that emergence and growth was good in the Moncut treatments.

Rhizoctonia - Evaluate Moncut (Flutolanil) for Control of Rhizoctonia Root Rot in Sugarbeets Pigeon, MI - 2012 (page 2 of 2)

Trial Quality: Fair
Planted: April 19
Harvested: Sept 17
Plot Size: 6 rows X 35 ft, 5 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: B-17RR32

Soil Info: Clay Loam, 2.0% OM, 7.2 pH
Previous Crop: Dry Beans
Other Pests: Seedling Disease
Seasonal Rainfall: 20.2 inches

Cercospora Control: 3 Applic. Good Control

Treatment	Rate/A	App & Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100'	Vigor Rate
Moncut	17.6 oz	IF, 3.5"	**$862**	**3734**	**192**	**19.5**	**13.9**	**93.0**	**5.3**	**6.8**
Quadris	7.125 fl oz	IF, 3.5"	**$793**	**3438**	**187**	**18.3**	**13.6**	**92.9**	**2.4**	**7.0**
Headline	6 fl oz	IF, 3.5"	$657	2864	**184**	15.5	**13.5**	**92.4**	16.0	5.5
Untreated Check			$483	2045	180	11.3	13.2	**92.4**	17.8	5.1
Average			$699	3020	186	16.2	13.5	92.7	10.3	6.1
LSD 5%			176.0	744.6	10.1	3.9	0.5	ns(1.1)	3.7	1.2
CV %			15.7	15.4	3.4	15.0	2.3	0.8	22.7	12.3

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Moncut (flutolanil) a systemic fungicide with a different mode of action than Quadris, was evaluated for Rhizoctonia control in sugarbeets. The trial was planted late. Moncut and Quadris gave similar levels of disease control. Headline was less effective. The disease level was moderate.

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Rhizoctonia - Control of Rhizoctonia in Sugarbeets with Quadris & Quadris Plus Mustang Applications Pigeon, MI - 2012 (page 1 of 3)

Trial Quality: Good
Planted: April 19
Harvested: Sept 18
Plot Size: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: B-17RR32

Soil Info: Clay Loam
2.0% OM, 7.2 pH
Previous Crop: Dry Beans

Other Pests: Seedling Disease
Seasonal Rainfall: 20.2 inches

Cercospora Control: 3 Applic, Good Control
Applic Date: June 20

Treatment	Rate fl oz/ Acre	App Time	Band Width inch	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets B/100 Jul-18
Quadris	14.3	IF	3.5	**$1,188**	**5122**	**208**	**24.6**	**14.6**	**94.1**	**5.0**
Mustang Max	4	IF	3.5							
Untreated Check				**$1,192**	**5042**	**206**	**24.4**	**14.5**	**94.1**	**5.0**
Mustang Max	4	IF	3.5	**$1,143**	**4879**	**203**	**24.1**	**14.4**	**93.7**	8.8
Quadris	8	6 lf	7	**$1,138**	**4910**	**205**	**23.9**	**14.5**	**94.0**	**5.0**
Mustang Max	4	6 lf	7							
Quadris	14.3	6 lf	7	**$1,079**	**4649**	198	**23.4**	14.1	**93.5**	**3.3**
Quadris	8	IF	3.5	**$1,050**	**4528**	199	**22.7**	**14.2**	**93.5**	**4.4**
Mustang Max	4	6 lf	7	**$1,025**	4378	199	**21.9**	14.1	**93.8**	**5.6**
Average				$1,116	4787	203	23.6	14.4	93.8	5.3
LSD 5%				ns(168)	711.7	8.2	ns(3.5)	0.4	ns(0.7)	3.4
CV %				10.1	9.9	2.7	10.0	1.7	0.5	43.3

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The disease level was low in this trial and the dead beets/100 ft are not meaningful. Quadris alone and in tank mix with Mustang Max, provided similar yield levels, indicating that Mustang Max did not cause yield reduction.

Rhizoctonia - Control of Rhizoctonia in Sugarbeets with T-Band Applications of Quadris & Quadris Plus Mustang Crumbaugh, Breckenridge, MI - 2012 (page 2 of 3)

Trial Quality: Good
Planted: March 29
Harvested: Oct 22
Plot Size: 6 rows X 35 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR824

Soil Info: Loamy Sand
1.9% OM, 6.9 pH
Previous Crop: Soybeans

Other Pests: None
Seasonal Rainfall: 22.0 inches

Cercospora Control: 3 Applic, Good Control

Treatment	Rate fl oz/ Acre	App Time	Band Width inch	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets B/100 Sept-19	Vigor 0-10 Aug-1
Quadris	7.1	IF	3.5	**$1,652**	**7099**	**261**	**27.2**	**17.8**	**94.8**	**38.5**	**7.9**
Untreated Check				$1,371	5909	**253**	23.3	**17.3**	**94.7**	60.5	6.1
Quadris	7.1	IF	3.5	$1,239	5352	**257**	20.8	**17.5**	**94.8**	**37.8**	**7.6**
Mustang Max	4	IF	3.5								
Mustang Max	4	IF	3.5	$1,202	5196	**254**	20.4	**17.4**	**94.6**	**49.1**	**6.9**

Average	$1,366	5889	256	22.9	17.5	94.8	46.5	7.1
LSD 5%	179.4	759.1	ns(12.5)	2.8	ns(0.6)	ns(0.6)	18.8	1.0
CV %	10.3	10.1	3.8	9.7	2.8	0.5	32.8	11.5

Bold: Results are not statistically different for top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Quadris and Quadris + Mustang, provided about 40 percent Rhizoctonia control in this trial. There was no difference in control between Quadris alone and the Quadris + Mustang tank mix.

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Rhizoctonia - Control of Rhizoctonia in Sugarbeets with Foliar Applications of Quadris & Quadris Plus Mustang Crumbaugh, MI - 2012 (page 3 of 3)

Trial Quality: Fair
Planted: March 29
Harvested: Oct 22
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR824

Soil Info: Loamy Sand, 1.9% OM, 6.9 pH
Previous Crop: Soybeans
Other Pest: None
Seasonal Rainfall: 22.0 inches

Cercospora Control: 4 Applic. Good Control
Spray Dates: May 23, 6 lf

Treatment	Rate fl oz/ Acre	App Time	Band Width Inch	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets B/110 Sept-17	Vigor 1-10 Aug-1
Quadris	14.3	6 lf	7	**$1,586**	**6805**	**261**	**26.1**	**17.8**	**94.8**	**34.1**	**6.6**
Mustang Max	4	6 lf	7								
Mustang Max	4	6 lf	7	**$1,388**	**5913**	**255**	**23.2**	**17.4**	**94.7**	51.2	**5.8**
Quadris	14.3	6 lf	7	**$1,377**	**5909**	**260**	**22.7**	**17.8**	**94.5**	**17.5**	**7.5**
Untreated Check				$1,269	5367	**261**	20.6	**17.7**	**94.9**	53.0	6.0
Average				$1,405	5999	259	23.1	17.6	94.7	38.9	6.5
LSD 5%				262.7	1111	ns(13.5)	3.7	ns(0.7)	ns(0.5)	21.3	1.2
CV %				15.0	14.9	4.2	12.7	3.3	0.5	44.6	14.4

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Quadris foliar applications provided fairly good Rhizoctonia control in this trial. The addition of Mustang Max to Quadris appeared to lower the level of Rhizoctonia control, but not significantly.

PIONEER · BIG CHIEF
MICHIGAN SUGAR

Rhizoctonia - Evaluate Fungicides & Varieties for Rhizoctonia Control Gilford - 2012

Trial Quality: Good
Planted: April 18
Harvested: Not harvested
Plot Size: 6 rows X 36 ft, 4 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Soil Info: Clay, 5.8% OM, 7.9 pH
Applic Dates: June 7 and June 20
Previous Crop: Oil Seed Radish

Other Pests: None
Rainfall to Counts: 7.1 inches

Treatment	Rate fl oz/A	Appl Timing	% Emergence		
			HM-27	SX-1281	C-827
Quadris	14.25	IF 3.5" band	**70**	**64**	**59**
Quadris	7.1	IF 3.5" band	**68**	**60**	**56**
Quadris	14.25	4 leaf	**71**	**64**	**61**
Quadris	14.25	8 leaf	**68**	**65**	**59**
Quadris Quadris	7.1 14.25	IF 3.5" band 8 leaf	**72**	**60**	**60**
Headline	9.5	IF 3.5" band	**66**	**62**	**60**
Moncut	17.6 oz dry	IF 3.5" band	64	**65**	**62**
Untreated			**66**	**62**	**59**
Average			68	63	60
LSD 5%			7.3	ns(7.3)	ns(7.3)
CV %			6.9	6.9	6.9

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Quadris, Headline and Moncut were evaluated for Rhizoctonia control in sugarbeets. None of the fungicides caused stand loss. The field was flooded and no more data was obtained.

Rhizoctonia - Control of Rhizoctonia with ActinoGrow (Biological Control Agent) in Sugarbeets Average of 4 Trials - 2012 (page 1 of 3)

Trial Quality: Fair to Good
Locations: Pigeon, Breckenridge
Saginaw, Breckenridge
Planted: April 5 to April 24
Harvested: Sept 17 to Oct 22

Plot Size: 6 rows X 35 ft, 3 reps - Pigeon
6 rows X 50 ft, 5 reps - Saginaw
6 rows X 38 ft, 3 reps - Breckenridge
Cercospora Control: 3-4 Applic
Good Control

Treatment	Rate	App & Width	Net $A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100	Stand B/100
ActinoGrow	12 oz/a	IF, 1	**$1,840**	**7784**	**262**	**29.2**	**17.8**	**94.7**	**1.4**	**171**
Quadris	7.1 fl oz/a	IF, 3.5	**$1,810**	**7658**	**262**	**28.6**	**17.8**	**94.7**	**2.2**	**170**
Untreated Check			**$1,638**	**6929**	**260**	**25.5**	**17.7**	**94.4**	**6.8**	**174**
Average			$1,763	7457	261	27.8	17.8	94.6	3.5	172
LSD 5%			ns(252)	ns(1068)	ns(4.9)	ns(4.7)	ns(0.2)	ns(0.5)	ns(7.7)	ns(13.7)
CV %			8.3	8.3	1.1	9.8	0.7	0.3	129.5	4.6

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: ActinoGrow is a biological agent (Streptomyces lydicus 0.04%) that has activity on Rhizoctonia and other fungi. Preliminary results (2010 through 2012) have been somewhat positive, however, more trials need to be conducted before we would make this a standard recommendation. ActinoGrow needs to be applied in-furrow at planting, dribbled in (not as a sprayed T-band). The product colonizes around the sugarbeet root and inhibits infections from Rhizoctonia. Best results will probably be in addition to a Quadris application, but Quadris needs to be sprayed in a T-band and ActinoGrow should be dribbled in. More research should be conducted with ActinoGrow and Quadris applications.

Rhizoctonia - Control of Rhizoctonia with ActinoGrow (Biological Control Agent) in Sugarbeets - 2012 (page 2 of 3)

Pigeon, MI

Trial Quality: Fair-Good
Planted: May 23
Harvested: Sept. 18
Plot Size: 6 rows X 35 ft, 3 reps
Row Spacing: 22 inch
Soil Info: Clay Loam, 2.0% OM, 7.2 pH
Previous Crop: Dry Beans
Seeding Rate: 4.1 inches
Variety: B-17RR32
Cercospora Control: 3 Applic, Good Control
Other Pests: Seedling Disease
Seasonal Rainfall: 20.2 inches

Treatment	Rate/A	App & Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100 Aug-14	Stand B/100	Vigor 0-10
ActinoGrow	12 oz	IF, 1	**$1,072**	**4537**	**191**	**23.7**	**13.8**	**93.0**	**2.0**	**185**	**7.1**
Quadris	7.1 fl oz	IF, 3.5	**$954**	**4035**	**194**	**20.8**	**13.9**	**93.3**	**1.0**	**178**	**6.9**
ActinoGrow	6 fl oz	IF, 1	$846	3577	175	**20.6**	13.2	91.4	**5.3**	**180**	**6.1**
Untreated Check			$593	2510	**184**	13.6	**13.6**	**92.2**	17.3	**175**	5.6
Average			$866	3665	186	19.7	13.6	92.5	6.4	180	6.4
LSD 5%			188.9	799.3	10.2	3.6	0.5	1.6	6.0	ns(13)	1.0
CV %			9.6	9.6	2.4	8.2	1.7	0.7	47.0	3.7	7.4

Crumbaugh, Breckenridge, MI

Trial Quality: Fair-Good
Planted: April 13
Harvested: Oct 26
Plot Size: 6 rows X 38 ft, 3 reps
Row Spacing: 22 inch
Soil Info: Loamy Sand, 1.9% OM, 6.9 pH
Previous Crop: Soybeans
Seeding Rate: 4.1 inches
Variety: SX-1291RR
Cercospora Control: 4 Applic, Good Control
Other Pests: None
Seasonal Rainfall: 22.9 inches

Treatment	Rate/A	App & Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100 Aug 2	Stand B/100 May 10
ActinoGrow	12 oz	IF, 1	**$1,839**	**7779**	**276**	**28.2**	**18.9**	**94.4**	**1.4**	**77**
Quadris	7.1 fl oz	IF, 3.5	**$1,834**	**7758**	**274**	**28.4**	**18.8**	**94.2**	**5.9**	**97**
ActinoGrow	6 oz	IF, 1	**$1,736**	**7345**	**263**	**27.9**	**18.2**	**93.8**	**4.0**	**102**
Untreated Check			**$1,517**	**6417**	**273**	23.6	**18.7**	**94.3**	**4.6**	**94**
Average			$1,731	7325	272	27.0	18.6	94.2	4.0	93
LSD 5%			ns(353)	ns(1492)	ns(29)	4.6	ns(1.3)	ns(1.5)	ns(7.3)	ns(25.7)
CV %			9.7	9.7	5.1	8.2	3.4	0.8	92	13.9

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Rhizoctonia - Control of Rhizoctonia with ActinoGrow (Biological Control Agent) in Sugarbeets - 2012 (page 3 of 3)

English, Breckenridge, MI

Trial Quality: Good
Planted: April 24
Harvested: Nov 2
Plot Size: 6 rows X 38 ft, 3 reps
Row Spacing: 22 inch

Soil Info: Clay loam
3.0% OM, 7.5 pH
Previous Crop: Wheat
Seeding Rate: 4.1 inches
Variety: SX-1291RR

Cercospora Control: 4 Applic
Good Control
Other Pests: None
Seasonal Rainfall: 21.5 inches

Treatment	Rate	App Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100 Aug-18	Stand B/100 Jul-10
ActinoGrow	12 oz/a	IF, 1	**$2,366**	**10010**	**312**	**32.2**	**20.6**	**95.7**	**1.0**	**214**
Quadris	7.1 fl oz/a	IF, 3.5	**$2,354**	**9959**	**312**	**31.9**	**20.5**	**96.0**	**1.7**	203
ActinoGrow	6 oz/a	IF, 1	**$2,232**	**9445**	**317**	**29.7**	**20.7**	**96.4**	**2.0**	**217**
Untreated Check			**$2,205**	**9329**	**313**	**29.9**	**20.7**	**95.6**	5.3	**215**
Average			$2,289	9686	313	30.9	20.6	95.9	2.5	212
LSD 5%			ns(332)	ns(1404)	ns(16.4)	ns(4.1)	ns(0.7)	ns(1.0)	3.6	11.6
CV %			7.3	7.3	2.6	6.6	1.6	0.5	72.7	2.7

Spero, Saginaw, MI

Trial Quality: Fair
Planted: April 19
Harvested: Oct 12
Plot Size: 6 rows X 50 ft, 5 reps
Row Spacing: 22 inch

Soil Info: Loam
4.0% OM, 7.4 pH
Previous Crop: Soybeans
Seeding Rate: 4.1 inches
Variety: B-17RR32

Cercospora Control: 4 Applic
Good Control
Other Pests: None
Seasonal Rainfall: 20.0 inches

Treatment	Rate	App Width	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead B/100 Aug-18	Stand B/100 Jul-10
Untreated Check			**$2,236**	**9461**	**270**	**35.1**	**18.0**	**95.6**	**0.0**	**211**
Quadris	7.1 fl oz/a	IF, 3.5	**$2,099**	**8881**	**267**	**33.3**	**17.9**	**95.6**	**0.2**	**204**
ActinoGrow	12 oz/a	IF, 1	**$2,083**	**8811**	**269**	**32.8**	**17.9**	**95.7**	**1.0**	**208**
Average			$2,139	9051	269	33.7	18.0	95.6	0.4	208
LSD 5%			ns(476)	ns(2014)	ns(16.4)	ns(8.1)	ns(0.9)	ns(0.7)	ns(2.0)	ns(10.6)
CV %			15.3	15.3	4.2	16.4	3.4	0.5	337.0	3.5

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Rhizoctonia Control Trial
Richmond Brothers Farms, Pigeon, MI - 2012

Trial Quality: Good
Variety: C-RR827
Planted: March 23
Harv/Samp: Nov 9/Oct 10
Plot Size: 4 reps
Row Spacing: 22 inch

Seed Rate: 69,000
Soil Info: Clay Loam
Fertilizer: 2010: 10,000 gal of manure, 2x2: 44-34-0 + micros & S, nitrate tested/applied N
Prev Crop: Corn

Rhizoc Control: Excellent Control: See Treatments
Cerc Control: Good Cont: 1. Proline + EBDC, 2. Gem + EBDC, 3. Proline + EBDC, 4. Eminent + EBDC
Other Pests: Mustang Max - In Furrow

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets/ 1200 Ft.
Check: In Furrow Only	—	**13148**	**293**	**45.0**	**20.1**	**94.0**	**13**
Quadris: 6-8 Leaf after Quadris In Furrow	—	**12493**	**280**	**44.6**	**19.5**	**93.5**	**5**
Vertisan: 6-8 Leaf after Quadris In Furrow	—	**12234**	**291**	**42.0**	**20.0**	**93.9**	**13**
Average	—	12625	288	43.9	19.9	93.8	10
LSD 5%	—	ns (902)	ns (18)	ns (4.0)	ns (0.9)	ns (0.7)	ns (33)
CV%	—	4	4	5.3	2.7	0.4	190

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was conducted to look at the efficacy of Rhizoctonia control with Quadris and Vertisan (penthiopyrad) applied as foliar applications. All treatments, including the check, had Quadris applied in-furrow. Disease level was very low and no significant yield or quality differences were measured between any treatments.

Quadris In Furrow: 3" Band, 5 oz/ac
Quadris 6-8 Leaf: 7" Band, 14.3 oz/ac
Vertisan 6-8 Leaf: 7" Band, 16 oz/ac

Rhizoctonia Control Trial
Triple K Farms, Saginaw, MI - 2012

Trial Quality:	Good	**Seed Rate:**	57,400	**Rhizoc Control:**	Good Control: See Treatments
Variety:	C-RR074NT	**Soil Info:**	Clay Loam		
Planted:	March 26	**Fertilizer:**	2x2:10 gal of 10-28-0 + S, PPI: 90# N from Urea, Var. Rate: K2O	**Cerc Control:**	Good Cont: 1. Eminent, 2. Headline + EBDC, 3. Eminent
Harv/Samp:	Nov 5/Oct 9				
Plot Size:	3 rep				
Row Spacing:	28 inch	**Prev Crop:**	Soybean	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft of Row		Dead Beets / 1200 Ft.	
							17 Day	37 Day	7/20/12	9/28/12
Quadris: In Furrow (8 oz/ac)	—	**11523**	**308**	**37.4**	**20.5**	**95.3**	**86**	**235**	**7**	**23**
Quadris: In Fur. & Vertisan: 6-8 Leaf	—	**11517**	**307**	**37.6**	**20.5**	**95.2**	**—**	**—**	**11**	**44**
Vertisan: 6-8 Leaf (16 oz/ac)	—	**11351**	**299**	**37.9**	**20.1**	**94.9**	**—**	**—**	**22**	**55**
Vertisan: 6-8 Leaf (24 oz/ac)	—	**10956**	**301**	**36.5**	**20.2**	**95.0**	**—**	**—**	**17**	**82**
Vertisan: In Fur. & Quadris: 6-8 Leaf	—	**10904**	**308**	**35.4**	**20.4**	**95.5**	**—**	**—**	**9**	**42**
Vertisan: In Furrow (16 oz/ac)	—	**10793**	**294**	**36.7**	**20.0**	**94.5**	**95**	**243**	**41**	**105**
Quadris: 6-8 Leaf (10.5 oz/ac)	—	**10768**	**301**	**35.8**	**20.2**	**95.1**	**—**	**—**	**10**	**54**
Check	—	**10603**	**304**	**34.9**	**20.4**	**95.0**	**85**	**236**	**42**	**107**
Average	—	11052	303	36.5	20.3	95.1	89	238	20	64
LSD 5%	—	ns(1099)	ns (13)	ns (4.1)	ns (0.6)	ns (0.6)	ns (24)	ns (12)	ns (44)	ns (80)
CV%	—	6	2	6.4	1.8	0.3	16.0	3.0	127	71

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trial was conducted to compare the efficacy of Quadris to Vertisan (penthopyrad), a new potential Rhizoctonia control fungicide for sugarbeets. Trial was located in a field that has a history of low beet yields. A susceptible Rhizoctonia variety with nematode tolerance was used for this trial. Field had low to moderate levels of Rhizoctonia infection even at the end of the season. Some trends exist for less Rhizoctonia with any treatments involving Quadris for both early and late dead beet counts but not at the 95% confidence level. Yield differences were not significantly different, but check yield did trend lower than any treatments when compared to Quadris, Vertisan or combinations of the two. The in furrow and foliar band widths were 5 and 7 inches, respectively.

Rhizoctonia Control Trial
D & D Schultz Farms, Linwood, MI - 2012

Trial Quality:	Good	**Seed Rate:**	49,000	**Rhizoc Control:**	See Treatments
Variety:	C-RR074NT	**Soil Info:**	Loam		
Planted:	April 7	**Fertilizer:**	2x2: 12 gal of 10-25-0 + micros + 6 gal 28%, PPI: 35 gal 28%	**Cerc Control:**	1. Inspire XT + EBDC, 2. Eminent + EBDC
Harv/Samp:	Oct 9/Oct 12				
Plot Size:	5 rep				
Row Spacing:	30 inch	**Prev Crop:**	Drybeans	**Other Pests:**	SB Cyst Nematode

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets / 1200 Ft.	
							6/12/12	7/13/12
Quadris: 6-8 Leaf (10.5 oz/ac)	$1,534	**6492**	**292**	**22.2**	**19.5**	**95.2**	**34**	**273**
Check	$1,224	5162	**284**	18.3	**19.0**	**95.2**	**51**	**344**
Vertisan: 6-8 Leaf (16 oz/ac)	$1,117	4713	**280**	16.9	**18.9**	**95.1**	62	405
Vertisan: 6-8 Leaf (24 oz/ac)	$1,098	4638	**281**	16.5	**18.9**	**95.0**	68	438
Average	—	5251	284	18.5	19.1	95.1	54	365
LSD 5%	—	737	ns (13)	2.6	ns (0.7)	ns (0.6)	23	114
CV%	—	10	3	10.3	2.5	0.4	31	23

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was conducted to compare the efficacy of Quadris to Vertisan (penthopyrad), a new potential Rhizoctonia control fungicide for sugarbeets. Trial was located in a sugarbeet field that has a history of Rhizoctonia issues. A one-time application of Quadris was compared to a 16 and 24 ounce rate of Vertisan applied at the 6-8 leaf stage. A susceptible Rhizoctonia variety was used and the field had heavy disease pressure. Quadris was significantly better than all other treatments for RWSA and Tons/Ac. Quadris was also significantly better than the Vertisan treatments for dead beet counts.

Rhizoctonia Control Trial
Steve Hoard, Breckenridge, MI - 2012

Trial Quality:	Fair	**Seed Rate:**	52,000	**Rhizoc Control:**	See Treatments
Variety:	B-17RR32	**Soil Info:**	Loam		
Planted:	March 29	**Fertilizer:**	2x2: 23 gal of 19-14-0 + micros, Sidedress: 60# of N, Variable rate applied K2O	**Cerc Control:**	Good Cont: 1. Proline + EBDC, 2. Headline + EBDC, 3. Eminent + EBDC
Harv/Samp:	Sept 17/Sept 11				
Plot Size:	4 rep				
Row Spacing:	30 inch	**Prev Crop:**	Soybeans	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft of Row		Dead Beets/ 1200 Ft.	
							19 Day	40 Day	6/11/12	7/16/12
Quadris: 6-8 Leaf (10.5 oz/ac)	—	**3194**	**212**	**14.9**	**14.8**	**94.2**	**—**	**—**	**51**	**477**
Vertisan: 6-8 Leaf (16 oz/ac)	—	**2685**	**216**	**12.3**	**14.9**	**94.7**	**—**	**—**	122	646
Quadris: In Furrow (8 oz/ac)	—	**2508**	**211**	**11.9**	**14.7**	**94.3**	**142**	**182**	**44**	656
Quadris: In Fur. & Vertisan: 6-8 Leaf	—	**2476**	**217**	**11.4**	**15.1**	**94.5**	**—**	**—**	**59**	**613**
Vertisan: In Fur. & Quadris: 6-8 Leaf	—	**2389**	**206**	**11.4**	**14.4**	**94.3**	**—**	**—**	**63**	**586**
Check	—	**2294**	**209**	**10.8**	**14.6**	**94.3**	**137**	**179**	152	717
Vertisan: 6-8 Leaf (24 oz/ac)	—	**2167**	**206**	**10.4**	**14.3**	**94.5**	**—**	**—**	130	734
Vertisan: In Furrow (16 oz/ac)	—	**1945**	**214**	**9.1**	**14.8**	**94.7**	**161**	**200**	143	839
Average	—	2457	211	11.5	14.7	94.4	147	187	96	658
LSD 5%	—	ns (895)	ns (10)	ns (4.1)	ns (0.5)	ns (0.7)	ns (28)	ns (18)	51	20%145
CV%	—	25	3	24.1	2.3	0.5	11.0	6.0	36	23

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was conducted to compare the efficacy of Quadris to Vertisan (penthiopyrad), a new potential Rhizoctonia control fungicide for sugarbeets. Trial was located in a sugarbeet field that has a history of Rhizoctonia issues. A susceptible Rhizoctonia variety was used and the field had severe disease pressure. Rhizoctonia dead beet counts taken on 06/11/12 indicated that all treatments that had Quadris applied in furrow, foliar, or in combination with Vertisan, had significantly better efficacy than Vertisan alone. The same counts taken on 07/17/12 generally showed the same trend but significant at the 80% level. Rhizoctonia pressure was so severe that neither product was able to have much efficacy by mid-season. Treatments that had Quadris applied, appeared to have a delayed die-off. By the end of the season all treatments and yields looked similar. In a direct comparison of an alone foliar application of Quadris to Vertisan, the Quadris yields trended better. The same is true with the in-furrow applications. In fields with this severe disease pressure, a combination of Rhizoctonia tolerant varieties and more than one Quadris application should be considered.

Rhizoctonia Control Trial
LAKKE Ewald Farms, Akron, MI - 2012

Trial Quality:	Good	**Seed Rate:**	65,250	**Rhizoc Control:**	Good Control: See Treatments
Variety:	C-RR074NT/HM-28RR	**Soil Info:**	Loam		
Planted:	March 25	**Fertilizer:**	Preplant: 33gal of 28%, 2x2 40-0-0# + micros & sulfur	**Cerc Control:**	Good Control: 1. Proline + EBDC, 2. Super Tin + EBDC, 3. Inspire XT + EBDC, 4. Kocide 3000
Harv/Samp:	October 2				
Plot Size:	5 rep				
Row Spacing:	20 inch	**Prev Crop:**	Corn	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets/ 1200 Ft.
Vertisan: 6-8 Leaf after Quadris In Furrow	—	**7851**	**324**	**24.2**	**21.2**	**96.0**	**22**
Quadris: 6-8 Leaf after Quadris In Furrow	—	**7673**	**324**	**23.7**	**21.3**	**96.0**	**21**
LSD 5%	—	ns (630)	ns (8)	ns (1.6)	ns (0.5)	ns (0.3)	ns (26)
CV%	—	5	1	3.7	1.5	0.2	70.0

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trial was conducted to compare Rhizoctonia control by applying Quadris or Vertisan (pentiopyrad) as a foliar treatment in a field that previously had a Quadris in furrow application. Rhizoctonia level was very low and no difference in efficacy could be shown. There were no significant differences in any yield or quality measurement. The trial used a seed mixture of 90% C-RR074NT and 10% HM-28RR.

Quadris 6-8 Leaf: 14.0 oz/ac
Vertisan 6-8 Leaf: 18.3 oz/ac

Preliminary Report - Rhizoctonia: Effect of Soil Moisture, Soil Temperature & *Rhizoctonia Solani* Group

Ridgetown, Ontario, Canada
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Objective: Investigate the relationship between soil temperature, soil moisture, and strains of ***R. solani*** on Rhizoctonia crown and root rot in a susceptible sugar beet variety.

Methods:
Trial Quality: Good **Planted:** April 27 **Variety:** C-RR827
Location: Ontario, Canada **Harvested:** September 20

- Decagon 5TM soil moisture and temperature sensors were installed in the main plots of the first two replications of the trial.
- The trial was arranged as a randomized split-plot with four replications per treatment.
  - Main plot moisture levels were applied using drip irrigation – 0, 1, 2, or 3 times per week.
  - Split-plots were inoculated with different isolates of ***R. solani*** – AG-2-2 IIIB = "36BR-2", AG-2-2 IV = "27BR-1", AG-4 = "26AR-1".
  - Inoculated 8 days before seeding and 77 days after seeding (DAS).

Summary:
- In 2012, we observed no differences in plant stand count or the rate of plant stand reduction. We did observe that the percent reduction in plant stand was greater in plots inoculated with AG-4 than AG-2-2IIIB and AG-2-2IV during the period 14 to 28 days after seeding. In 2012 there were no interactions with irrigation regime and ***R. solani*** isolate, indicating that the levels of diseases caused by one factor (strain types) are not dependent with another factor (irrigation) and vice versa. This suggests that future development of decision support tools for Rhizoctonia crown and root rot management could be applied similarly for AG-4, AG-2-2IV, and AG-2-2IIIB.
- Irrigation regimes did influence disease severity and disease incidence in 2012, however there were no interactions with irrigation regime and ***R. solani*** AG or ISG. Disease incidence in beets over the season was higher in irrigated once per week than rain-fed beets. Disease severity at harvest was higher in beets irrigated once and twice per week than rain-fed beets. These results indicate that soil moisture levels can influence severity of crown and root rot. This agrees with previous research results indicating that soil moisture can influence root rot severity, but is encouraging because our results indicate this response is similar for the major ***R. solani*** subgroups.
- Correlation analysis with two year combined data showed significant positive association of volumetric moisture content (VMC) with Rhizoctonia root rot incidence (r = 0.84, ***P value 0.009***) and severity (r = 0.79, ***P value 0.019***) during the early period of the growing season (seeding to mid-July), when relatively less rainfall occurred than in later season. We will continue data analysis using 2011 and 2012 data.

Preliminary Report - Rhizoctonia: Effect of Soil Moisture, Soil Temperature & *Rhizoctonia Solani* Group (continued)

Results:

Table 1. Rate of plant stand reduction, disease severity index (DSI), disease incidence, and area under the disease progress curve (AUDPC) of Rhizoctonia crown and root rot in sugarbeets harvested 80, 111, and 146 days after seeding (DAS), Ridgetown, 2012.

	Rate of Reduction (# plants lost per day)	Incidence of Rhizoctonia crown and root rot			Severity of Rhizoctonia crown and root rot (DSI)			AUDPC	
Treatment	14 – 28 DAS	80 DAS	111 DAS	146 DAS	80 DAS	111 DAS	146 DAS	Severity	Incidence
Irrigation regime									
Rain-fed	9.5 ns [a]	18.5 ns	56.7 b	67.1 ns	4.6 ns	24.8 ns	35.9 b	1517 ns	3330 b
1x / week	9.0	28.6	74.8 a	82.5	6.2	41.1	52.3 a	2367	4355 a
2x / week	0.0	26.1	68.0 ab	78.2	8.0	37.2	52.5 a	2233	4017 ab
3x / week	5.6	24.2	73.2 ab	65.2	4.3	41.9	42.5 ab	2239	3931 ab
R. solani type									
AG-4	10.4 a	21.9 ns	76.2 a	76.6 a	5.6 ns	38.4 ab	46.3 ab	2164 a	4188 a
AG2-2IIIB	4.5 b	23.8	77.8 a	82.2 a	7.5	45.8 a	56.5 a	2566 a	4391 a
AG2-2IV	3.2 b	26.3	50.5 b	61.0 b	6.4	24.5 b	34.6 b	1537 b	3146 b

[a] Numbers in a column group followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's adjustment. Data from different R. solani types or irrigation regimes was combined when ANOVA revealed no irrigation*isolate interaction. ns= not significant.

Table 2. Relationship among soil moisture, temperature and Rhizocotonia root rot and sugarbeet yield in combined analysis of 2011 and 2012 data (n = 8), Ridgetown, Ontario, Canada.

	July Harvest		August Harvest		September Harvest	
Parameters [a]	r	P value	r	P value	r	P value
Soil moisture vs Disease incidence	0.84	0.009	-0.28	0.498	-0.19	0.648
Soil moisture vs Disease severity	0.79	0.019	0.24	0.569	0.10	0.848
Soil moisture vs Yield	-0.13	0.753	0.53	0.181	0.40	0.322
Soil temperature vs Disease incidence	0.20	0.628	-0.74	0.036	-0.43	0.283
Soil temperature vs Disease severity	0.26	0.543	-0.56	0.149	-0.21	0.616
Soil temperature vs Yield	-0.20	0.633	0.90	0.002	0.65	0.080
Soil moisture vs Temp	-0.13	0.766	0.26	0.534	0.34	0.405

[a] P-value ≤ 0.05 indicates significant relationship among the two factors tested. Values of 'r' closer to +/- 1.0 indicate a stronger relationship among the factors. This analysis tests for relationship among factors but does not test for direct cause and effect.

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Cercospora - Summary of Cercospora Leafspot Trials Conducted in 2012

Two very intensive Cercospora fungicide trials were conducted in 2012 (Elkton and Blumfield) that evaluated all of the approved fungicides and also evaluated an experimental product, Bravo. Leafspot pressure was very high in these trials. At both locations, Inspire clearly provided the best control of Cercospora leafspot. The other triazoles (Eminent, Enable and Proline) and Super Tin also gave good results. The strobilurin fungicides (Headline and Gem) and Topsin failed to provide adequate control at both locations. Bravo, another protectant type fungicide, was less effective than the triazoles, but gave adequate control. All of the fungicides were tested alone and in tank mix with Dithane. The addition of Dithane improved Cercospora control in every case. The treatments were applied as part of a 4 spray sequence. The tested fungicide was the first and last in the sequence, with Dithane and Copper as the number two and three sprays.

Another set of trials evaluated the triazoles (Inspire, Eminent and Proline), strobilurins (Headline and Gem), Topsin M, Super Tin, Dithane and Cuprofix for possible fungicide resistance at Blumfield, Elkton and Breckenridge. Leafspot pressure was moderate to high. Information from these trials suggests that the triazoles, Super Tin, Dithane and Cuprofix are providing effective leafspot control. The strobilurins and Topsin failed to provide leafspot control at each location.

Two trials were conducted to see if 6 closely timed applications of Manzate + Cuprofix would provide adequate leafspot control. Leafspot pressure was moderate to high. Manzate (dry and liquid) and different rates of Cuprofix were evaluated. Two comparison treatments were also tested. Eminent + Manzate was followed by Super Tin + Topsin, followed by Inspire + Manzate, followed by Cuprofix + Manzate, followed by Proline + Manzate. A similar treatment which substituted Headline in the place of Inspire was also tested. All of the treatments provided good control of Cercospora in these trials. The Triazole tank mix / sequential treatments provided the best leafspot control, followed by the Triazole treatment which included Headline and finally the 6 Manzate + Cuprofix treatments. It appeared that the Headline treatment was helped by the tank mix and the products used before and after. Headline was tested in another trial at this location and failed.

Two grower strip trials were conducted in 2012 by giving Manzate to growers and asking them to spray Manzate "early" on every other sprayer pass. The Manzate application was made about 10 days before 50 DSVs when the growers started their normal spray program. The early Manzate treatment followed by the normal spray program was clearly superior to the normal spray program without the early Manzate. Similar grower strip trials were conducted in 2010 which found essentially the same thing.

A long term summary (2008 to 2012) of fungicide use is included in this report. Strobilurins provided good leafspot control from 2003 until 2010, similar to Eminent. In 2011 and 2012 Headline and Gem (strobilurins) failed in our trials. Triazoles (Inspire, Eminent, Proline and Enable) and Super Tin gave good results in the same trials.

Three BEETcast trials were conducted (Red, Green and Yellow zones). Each trial has a summary, however, in general we are finding that 50 to 55 DSVs followed by 40 DSVs for susceptible varieties in a Red zone is not adequate, possibly because the strobilurin fungicides are not a part of the spray mix anymore. We will be recommending a 50 DSV followed by 25 DSV or label days in Red zones with susceptible varieties. Better results can be obtained by adding an early EBDC treatment, approximately 10 days before the normal 50 DSV starting point. Cercospora pressure was high in the Red Zone Trial. All of the treatments provided good Cercospora control in the Ruth trial (Yellow zone). However, we are not going to recommend some of the less intensive treatments for this region without further research. The BEETcast trial in Sandusky had a higher level of leafspot than we have seen in the past. Good leafspot control was obtained with treatments starting as late as 75 DSV's as long as the repeat treatments were on a tight schedule. BEETcast at 55, 65 or 75 DSV's, followed by 55 DSV's, was less effective than the same starting times, followed by closer timings as recommended by the fungicide labels. Treatments starting at 85 DSV's or at first spot failed, regardless of the re-treatment schedule.

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Cercospora - Control of Cercospora Leafspot in Sugarbeets with Approved & Experimental Fungicide Applications Herford Farm, Elkton, MI - 2012 (page 1 of 3)

Trial Quality: Good
Planted: April 2
Harvested: Oct 8
Plot Size: 6 rows X 50 ft, 4 reps
Previous Crop: Corn
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR824
Rhizoc Control: No Quadris, fair-good control
Other Pests: None
Seasonal Rain: 20.2 inches
Applied: Jul 7 (55 DSV), Aug 3 (105 DSV), Aug 14 (130 DSV) Aug 30 (155 DSV)

Treatment*	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire 7 fl oz + Dithane	**$2,418**	**3.8**	**10525**	**300**	**35.1**	**20.1**	**95.1**
Inspire 7 fl oz	$2,226	**8.0**	9670	**282**	**34.3**	18.9	**95.2**
Super Tin 8 fl oz + Dithane	**$2,301**	**12.0**	**10012**	**292**	**34.2**	**19.6**	**95.2**
Super Tin 8 fl oz	$2,236	21.5	9673	**289**	33.4	**19.4**	**95.2**
Eminent 13 fl oz + Dithane	**$2,268**	27.0	9848	**298**	33.0	**20.0**	**95.1**
Eminent 13 fl oz	$2,018	53.5	8836	272	32.4	18.5	94.6
Topsin 20 fl oz + S Tin 8 fl oz	$2,251	27.5	9779	**285**	**34.3**	19.1	**95.2**
Enable 8 oz + Dithane	$2,228	17.5	9724	**288**	**33.8**	**19.4**	**94.9**
Enable 8 fl oz	$1,961	23.0	8551	272	31.3	18.5	**94.7**
Proline 5.7 fl oz + Dithane	$2,127	19.5	9293	**284**	32.8	**19.1**	**95.0**
Proline 5.7 fl oz	$2,121	31.5	9226	281	32.9	19.0	**94.8**
Bravo 3 pt + Dithane	$2,078	37.8	9065	**283**	32.0	19.0	**95.1**
Bravo 3 pt	$2,006	50.3	8698	272	32.0	18.5	94.6
Bravo 2 pt + Dithane	$2,063	50.0	9005	274	32.8	18.7	94.6
Bravo 2 pt	$2,052	59.8	8894	271	32.8	18.4	**94.8**
Bravo 1.5 pt + Dithane	$2,008	47.0	8771	274	32.0	18.6	94.7
Bravo 1.5 pt	$1,965	62.8	8524	271	31.5	18.4	94.6
Topsin 20 fl oz + Dithane	$1,965	56.3	8609	270	31.9	18.3	94.9
Topsin 20 fl oz	$1,931	84.8	8422	264	31.8	17.9	**95.0**
Headline 9.2 fl oz + Dithane	$1,775	74.0	7804	258	30.2	17.6	94.6
Headline 9.2 fl oz	$1,598	82.8	7013	240	29.2	16.6	94.4
Gem 3.6 fl oz + Dithane	$1,723	71.0	7587	259	29.3	17.7	94.7
Gem 3.6 fl oz	$1,618	88.3	7100	242	29.3	16.6	94.5
Untreated	$1,670	100.0	7067	240	29.5	16.4	94.7
Average	$2,020	47.6	8790	273	32.1	18.5	94.8
LSD 5%	153.3	9.8	648.6	17.8	1.4	1.0	0.5
CV %	5.3	14.5	5.2	4.6	3.1	3.9	0.4

***Treatment:** Each treatment was sprayed 4 times. The 1st and 4th with the listed treatment and the 2nd with Dithane (2 lb/A) and the 3rd with Kocide (2 lb/A). Proline treatment included NIS at 0.125%.

Bold: Results not statistically different from the top-ranking treatment in each column.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Inspire Provided excellent leafspot control. The addition of Dithane improved results for all treatments. Topsin, Headline and Gem failed to control the disease.

Cercospora - Control of Cercospora Leafspot in Sugarbeets with Approved & Experimental Fungicide Applications Herford Farm, Elkton, MI - 2012 (page 2 of 3)

Fungicide Effects (Avg of Tank Mix & No Tank Mix for Each Treatment)

Fungicide	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire 7 oz	**$2,322**	**5.9**	**10098**	**291**	**34.7**	**19.5**	**95.1**
Super Tin 8 oz	**$2,269**	16.8	**9842**	**291**	**33.8**	**19.5**	**95.2**
Topsin 20 oz + S Tin 8 oz	**$2,251**	27.5	**9779**	**285**	**34.3**	**19.1**	**95.2**
Eminent 13 oz	**$2,143**	40.3	**9342**	**285**	32.7	**19.3**	**94.8**
Proline 5.7 oz + nis .125%	**$2,124**	25.5	**9260**	**282**	32.8	**19.1**	**94.9**
Enable 8 oz	$2,095	20.3	9137	**280**	32.5	**18.9**	**94.8**
Bravo 2 pt	$2,058	54.9	8949	**273**	32.8	**18.5**	**94.7**
Bravo 3 pt	$2,042	44.0	8882	**277**	32.0	**18.8**	**94.8**
Bravo 1.5 pt	$1,986	54.9	8647	**272**	31.7	**18.5**	**94.7**
Topsin 20 oz	$1,948	70.5	8516	267	31.9	18.1	95.0
Headline 9.2 oz	$1,686	78.4	7408	249	29.7	17.1	94.5
Gem 3.6 oz	$1,671	79.6	7344	250	29.3	17.1	94.6
Untreated	$1,670	100.0	7067	240	29.5	16.4	**94.7**
Average	$2,020	47.6	8790	273	32.1	18.5	94.8
LSD 5%	209.3	10.0	885.7	18.7	1.8	1.1	0.5

Tank Mix Effects (Avg of All Fungicides - Tank Mix vs No Tank Mix)

Fungicide	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Fungicide + Tank Mix	**$2,067**	**41.8**	**9007**	**277**	**32.4**	**18.7**	**94.9**
Fungicide Only	$1,973	53.4	8573	268	31.9	18.2	94.8
Average	$2,020	47.6	8790	273	32.1	18.5	94.8
LSD 5%	42.5	2.7	179.9	5.0	0.4	0.3	0.1

Bold: Results are not statistically different for top-ranking treatment in each column.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Inspire gave excellent Cercospora control. Several other fungicides provided intermediate levels of control and Headline, Gem and Topsin failed to control leafspot.

Cercospora - Control of Cercospora Leafspot in Sugarbeets with Approved & Experimental Fungicide Applications Blumfield, MI - 2012 (page 3 of 3)

Trial Quality:	Good	**Soil Info:**	Clay Loam	**Rhizoc Cont:**	Quadris T-band
Planted:	April 13		2.9% OM, 7.3 pH		and 6-8 lf, Good Control
Harvested:	Sept 13	**Previous Crop:**	Soybeans	**Other Pests:**	None
Plot Size:	6 rows X 35 ft, 4 reps	**Seeding Rate:**	4.1 inches	**Seasonal Rainfall:**	21.9 inches
Row Spacing:	22 inch	**Variety:**	C-RR824		

Fungicides Applied: Jul 7 (55 DSV), Jul 30 (105 DSV), Aug 13 (140 DSV), Aug 21 (155 DSV)

Treatment	Rate / Acre	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Eminent, Dithane Cuprofix, Eminent	13 oz, 1.6 qt 1.5 lb, 13 oz	**$1,731**	**3.8**	**7597**	**223**	**34.1**	**15.6**	**93.9**
Inspire, Dithane Cuprofix, Inspire	8 oz, 1.6 qt 1.5 lb, 8 oz	**$1,670**	**1.1**	**7341**	**223**	**32.9**	**15.6**	**94.0**
Proline + Induce, Dithane Cuprofix, Proline + Induce	5.7 oz + .125%, 1.6 qt 1.5 lb, 5.7 oz + .125%	**$1,626**	**5.3**	**7152**	**223**	**32.1**	**15.7**	**93.7**
Bravo, Dithane Cuprofix, Bravo	2 pt, 1.6 qt 2 lb, 1.6 qt	**$1,623**	22.3	**7038**	**213**	**33.0**	**15.1**	**93.3**
Bravo, Dithane Cuprofix, Bravo	1.5 pt, 1.6 qt 1.5 lb, 1.6 qt	**$1,602**	23.0	**6945**	**214**	**32.7**	**15.1**	**93.5**
Bravo, Dithane Cuprofix, Bravo	3 pt, 1.6 qt 1.5 lb, 1.6 qt	**$1,596**	19.8	**6922**	**214**	**32.4**	**15.2**	**93.3**
Enable + Dithane + COC Dithane, Cuprofix Enable + Dithane + COC	8 oz + 1.6 qt + 2 qt 1.6 qt, 1.5 lb 8 oz + 1.6 qt + 2 qt	**$1,583**	13.0	**6993**	**217**	**32.2**	**15.3**	**93.7**
Super Tin, Dithane Cuprofix, Super Tin	8 oz, 1.6 qt 1.5 lb, 8 oz	**$1,553**	14.0	6802	**210**	**32.4**	15.0	**93.3**
Cuprofix, Dithane Cuprofix, Cuprofix	1.5 lb, 1.6 qt 1.5 lb, 1.5 lb	$1,527	21.3	6628	**215**	**30.9**	**15.2**	**93.6**
Dithane, Dithane Cuprofix, Dithane	1.6 qt, 1.6 qt 1.5 lb, 1.6 qt	$1,519	21.8	6596	**219**	30.1	**15.4**	**93.9**
Gem, Dithane Cuprofix, Gem	3.6 oz, 1.6 qt 1.5 lb, 3.6 oz	$1,479	28.0	6532	**212**	**30.9**	**15.1**	**93.2**
Topsin + Dithane, Dithane Cuprofix, Topsin + Dithane	20 oz + 1.6 qt, 1.6 qt 1.5 lb, 20 oz + 1.6 qt	$1,477	34.0	6501	207	**31.5**	14.8	**93.0**
Topsin + S Tin, Dithane Cuprofix, Topsin + S Tin	20 oz + 8 oz, 1.6 qt 1.5 lb, 20 oz + 8 oz	$1,462	25.5	6457	208	**31.1**	14.9	92.9
Kocide 3000, Dithane Cuprofix, Kocide 3000	2 lb, 1.6 qt 1.5 lb, 2 lb	$1,350	42.5	5882	204	29.0	14.6	**93.2**
Untreated		$1,301	78.5	5504	192	28.7	13.9	92.7
Headline, Dithane Cuprofix, Headline	9.2 oz, 1.6 qt 1.5 lb, 9.2 oz	$1,291	42.5	5738	195	29.3	14.2	92.4
Average		$1,524	24.8	6664	212	31.5	15.0	93.4
LSD 5%		178.8	10.3	755.4	14.5	3.6	0.7	1.0
CV %		8.2	29.2	7.9	4.8	8.0	3.3	0.8

Bold: Results are not statistically different for top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Approved fungicides and the experimental fungicide Bravo were evaluated for Cercospora leafspot control in this trial. Inspire (Triazole) is the only product that gave good control. Eminent and Proline (Triazoles) provided fair-good control. Super Tin and Bravo gave intermediate control and Dithane and lower Bravo rates were only fair. The Strobilurin products, Gem and Headline, and Topsin failed.

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Cercospora - Control of Cercospora Leafspot in Sugarbeets with Registered Fungicides Average of 2 Trials (Elkton & Blumfield) - 2012 (page 1 of 4)

Treatment	Rate	Applic DSV	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire	7 fl oz/a	55	**$2,042**	**0.6**	**8647**	**264**	**32.8**	**18.1**	**94.1**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Inspire	7 fl oz/a	160							
Eminent	13 fl oz/a	55	**$1,976**	**1.8**	**8371**	**256**	**32.8**	**17.8**	**93.8**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Eminent	13 fl oz/a	160							
Proline SC	5.7 fl oz/a	55	**$1,964**	**2.9**	**8332**	**257**	**32.5**	**17.7**	**94.2**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Proline SC	5.7 fl oz/a	160							
Super Tin	8 fl oz/a	55	**$1,806**	**3.9**	**7649**	**249**	30.7	**17.1**	**94.4**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Super Tin	8 fl oz/a	160							
Dithane F-45	1.6 qt/a	55	**$1,786**	**6.4**	**7570**	**246**	30.7	**17.1**	**94.1**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Dithane F-45	1.6 qt/a	160							
Cuprofix	1.5 lb/a	55	**$1,774**	**8.2**	**7519**	**240**	31.4	**16.7**	**93.8**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Cuprofix	1.5 lb/a	160							
Topsin M	20 fl oz/a	55	$1,736	22.8	7358	**241**	30.5	**16.8**	**93.9**
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Topsin M	20 fl oz/a	160							
Gem SC	3.6 fl oz/a	55	$1,698	17.2	7185	237	30.3	**16.6**	93.6
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Gem SC	3.6 fl oz/a	160							
Headline	9.2 fl oz/a	55	$1,629	24.7	6905	232	29.8	16.3	93.5
Dithane F-45	1.6 qt/a	95							
Cuprofix	1.5 lb/a	130							
Headline	9.2 fl oz/a	160							
Untreated Check			$1,477	46.2	6244	235	26.5	16.4	**93.9**
Average			$1,789	13.5	7578	246	30.8	17.1	93.9
LSD 5%			294.7	16.3	1237.8	27.5	2.0	1.6	0.7
CV %			7.3	53.6	7.2	5.0	2.9	4.3	0.3

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Cercospora - Control of Cercospora Leafspot in Sugarbeets with Registered Fungicides Herford, Elkton, MI - 2012 (page 2 of 4)

Trial Quality: Good
Planted: April 2
Harvested: Oct 7
Plot Size: 6 rows X 50 ft, 4 reps
Row Spacing: 22 inch

Previous Crop: Corn
Seeding Rate: 4.1 inches
Variety: C-RR824
Seasonal Rain: 20.2 inches
Applied: Jul 7 (55 DSV), Aug 3 (105 DSV), Aug 14 (130 DSV), Aug 30 (155 DSV)

Rhizoc Control: No Quadris
Fair-Good Control
Other Pests: None

Treatment*	Rate / Acre	Net $/A	Cerc % Desicc Aug 24	RWSA	RWST	T/A	% Sugar	% CJP
Inspire fb Dithane fb Cuprofix fb Inspire	8 oz, 1.6 qts 1.5 lb, 8 oz	**$2,153**	**0.8**	**9108**	**280**	**32.5**	**19.1**	**94.3**
Proline + Induce fb Dithane fb Cuprofix fb Proline + Induce	5.7 oz + .125% 1.6 qt, 1.5 lb 5.7 oz + .125%	**$2,060**	**1.5**	**8716**	**276**	**31.6**	**18.9**	**94.3**
Eminent fb Dithane fb Cuprofix fb Eminent	13 oz, 1.6 at 1.5 lb, 13 oz	**$2,035**	**1.1**	**8608**	**274**	**31.4**	**19.0**	**93.7**
Super Tin fb Dithane fb Cuprofix fb Super Tin	8 oz, 1.6 qts 1.5 lb, 8 oz	$1,781	**4.5**	7533	253	**29.7**	17.4	**94.5**
Cuprofix fb Dithane fb Cuprofix fb Cuprofix	1.5 lb, 1.6 qt 1.5 lb, 1.5 lb	$1,715	6.5	7255	247	29.3	17.2	**93.9**
Dithane fb Dithane fb Cuprofix fb Dithane	1.6 qt, 1.6 qt 1.5 lb, 1.6 qt	$1,706	5.5	7217	250	28.9	17.3	**93.9**
Topsin M fb Dithane fb Cuprofix fb Topsin M	20 oz, 1.6 qt 1.5 lb, 20 oz	$1,647	27.8	6968	242	28.8	16.8	**93.9**
Gem SC fb Dithane fb Cuprofix fb Gem SC	3.6 oz, 1.6 qt 1.5 lb, 3.6 oz	$1,594	18.3	6745	240	28.1	16.9	93.2
Headline, fb Dithane fb Cuprofix fb Headline	9.2 oz, 1.6 qt 1.5 lb, 9.2 oz	$1,523	27.8	6442	229	28.2	16.3	93.1
Untreated Check		$1,326	61.5	5609	230	24.3	16.1	**93.6**
Average		$1,754	15.5	7420	252	29.3	17.5	93.9
LSD 5%		197.5	4.6	835.7	13.4	2.8	0.7	0.9
CV %		7.8	20.3	7.8	3.7	6.5	2.7	0.7

* fb: means Followed By.

Bold: Results are not statistically different from top-ranking treatment in each column.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Fungicides were evaluated for Cercospora control in this spray trial. The disease level was medium to high. Triazole fungicides (Inspire, Proline and Eminent) provided good control. Super Tin, Dithane and Cuprofix provided intermediate control, whereas the Strobilurins (Headline and Gem) and Topsin did not provide adequate control.

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Cercospora - Control of Cercospora Leafspot in Sugarbeets with Registered Fungicides Blumfield, MI - 2012 (page 3 of 4)

Trial Quality: Good
Planted: April 12
Harvested: Sept 15
Plot Size: 6 rows X 35 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches
Variety: C-RR827

Soil Info: Clay Loam, 2.0% OM, 7.8 pH
Previous Crop: Oil Seed Radish
Other Pests: None
Seasonal Rainfall: 21.9 inches
Applic: Jul 7 (55 DSVf), Jul 30 (105 DSVf), Aug 13 (140 DSVf), Aug 21 (155 DSVf)

Rhizoc Control: Quadris T-band and 6-8 lf, good control

Treatment*	Rate/Acre	Net $/A	Cerc % desicc Sep 13	RWSA	RWST	T/A	% Sugar	% CJP
Inspire fb Dithane fb Cuprofix fb Inspire	8 oz, 1.6 qts 1.5 lb, 8 oz	**$1,931**	**0.4**	**8170**	**248**	**33.1**	**17.2**	**94.0**
Eminent fb Dithane fb Cuprofix fb Eminent	13 oz, 1.6 qt 1.5 lb, 13 oz	**$1,917**	**2.4**	**8111**	**238**	**34.2**	**16.5**	**93.9**
Proline + Induce fb Dithane fb Cuprofix fb Proline + Induce	5.7 oz + .125% 1.6 qt, 1.5 lb 5.7 oz + .125%	**$1,867**	**4.3**	**7900**	**239**	**33.3**	**16.6**	**94.1**
Dithane fb Dithane fb Cuprofix fb Dithane	1.6 qt, 1.6 qt 1.5 lb, 1.6 qt	**$1,867**	7.3	**7899**	**243**	**32.6**	**16.8**	**94.2**
Cuprofix fb Dithane fb Cuprofix fb Cuprofix	1.5 lb, 1.6 qt 1.5 lb, 1.5 lb	**$1,833**	9.8	**7755**	233	**33.4**	16.3	93.7
Super Tin fb Dithane fb Cuprofix fb Super Tin	8 oz, 1.6 qts 1.5 lb, 8 oz	**$1,832**	**3.3**	**7753**	**245**	**31.7**	**16.9**	**94.4**
Topsin M fb Dithane fb Cuprofix fb Topsin M	20 oz, 1.6 qt 1.5 lb, 20 oz	**$1,826**	17.8	**7725**	**241**	**32.2**	**16.8**	**93.9**
Gem SC fb Dithane fb Cuprofix fb Gem SC	3.6 oz, 1.6 qt 1.5 lb, 3.6 oz	**$1,802**	16.2	**7625**	**235**	**32.5**	16.3	**94.0**
Headline, fb Dithane fb Cuprofix fb Headline	9.2 oz, 1.6 qt 1.5 lb, 9.2 oz	$1,735	21.7	7342	234	**31.4**	16.3	**93.9**
Untreated Check		$1,628	30.8	6888	**240**	28.7	**16.6**	**94.2**
Average		$1,824	11.4	7717	240	32.3	16.6	94.0
LSD 5%		179.9	6.8	761.1	13.5	3.2	0.7	0.6
CV %		8.5	50.8	8.5	4.8	8.4	3.8	0.5

* fb: means Followed By.

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: This small plot replicated trial evaluated fungicides available to control Cercospora leafspot. Inspire and Eminent (Triazoles) provided good control, while Proline (Triazole) and Super Tin gave fairly good control. Dithane and Cuprofix provided intermediate control, while Headline, Gem (Strobilurins) and Topsin failed.

Cercospora - Control of Cercospora Leafspot in Sugarbeets with Registered Fungicides Crumbaugh Farm, Breckenridge, MI - 2012 (page 4 of 4)

Trial Quality: Fair-Good
Planted: March 29
Harvested: Oct 26
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR827

Soil Info: Loamy Sand, 1.9% OM, 6.9 pH
Previous Crop: Soybeans
Other Pests: None
Seasonal Rainfall: 22.0 inches

Rhizoc Control: Quadris, T-band and 6-8 lf Good Control

Treatment	Rate/A	Applic DSV	Net $/A	Cerc Avg 2 %desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire	7 oz	55	**$1,792**	**2.0**	**7833**	**276**	**28.3**	**18.4**	**95.5**
Dithane F-45	1.6 qt	95							
Cuprofix	2 lb	130							
Inspire	7 oz	160							
Gem SC	3.6 oz	55	$1,478	62.8	6506	256	25.4	17.2	**95.6**
Dithane F-45	1.6 qt	95							
Cuprofix	2 lb	130							
Gem SC	3.6 oz	160							
Headline	9.2 oz	55	$1,363	60.2	6019	258	23.4	17.4	**95.3**
Dithane F-45	1.6 qt	95							
Cuprofix	2 lb	130							
Headline	9.2 oz	160							
Topsin M	20 oz	55	$1,163	79.3	5132	236	21.6	16.1	94.8
Dithane F-45	1.6 qt	95							
Cuprofix	2 lb	130							
Topsin M	20 oz	160							
Untreated Check			$1,074	95.4	4545	224	20.1	15.4	94.8
Average			$1,374	59.9	6007	250	23.8	16.9	95.2
LSD 5%			207.2	7.4	876.6	17.4	2.5	0.9	0.6
CV %			12.5	10.3	12.1	5.8	8.7	4.6	0.6

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: This small replicated trial evaluated a triazole fungicide, Inspire, compared to Headline, Gem and Topsin (fungicides with suspected resistance). The disease level was high. Inspire provided good Cercospora control while the Strobilurins and Topsin failed to control Cercospora leafspot.

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Cercospora - Multiple Manzate & Cuprofix Applications Average 2 Locations (Elkton & Breckenridge) - 2012 (page 1 of 3)

Applic: Manz + Copper; 55DSV / 10 days
Eminent Mix; 55 DSV / 25 DSV

Treatment	Rate oz or lb	# App	Net $/A	RWSA	RWST	% Desicc	T/A	% Sugar	% CJP
Eminent + Manzate	13 + 2	1	**$2,710**	**11720**	**297**	**0.3**	**39.1**	**19.8**	**95.5**
S Tin + Topsin	8 + 20	1							
Inspire + Manzate	7 + 2	1							
Cuprofix + Manzate	2 + 2	1							
Proline* + Manzate	5.7 + 2	1							
Manzate Fl	1.6 qt/a	6	**$2,633**	**11350**	**298**	**1.4**	**38.0**	**19.8**	**95.5**
Cuprofix Ultra 40	3 lb/a								
Manzate Prostick	2 lb/a	6	**$2,563**	**11056**	**297**	**2.1**	**37.1**	**19.7**	**95.6**
Kocide 3000	2 lb/a								
Manzate Fl	1.6 qt/a	6	**$2,560**	**11044**	**293**	**1.4**	**36.9**	**19.6**	**95.3**
Cuprofix Ultra 40	1.5 lb/a								
Manzate Prostick	2 lb/a	6	**$2,538**	**10951**	**299**	**1.5**	**36.7**	**20.0**	**95.3**
Cuprofix Ultra 40	3 lb/a								
Manzate Prostick	2 lb/a	6	$2,517	10862	**297**	**1.9**	35.8	**19.8**	**95.5**
Cuprofix Ultra 40	1.5 lb/a								
Eminent + Manzate	13 + 2	1	$2,436	10562	282	**0.8**	**37.5**	19.0	94.9
S Tin + Topsin	8 + 20	1							
Headline + Manzate	7 + 2	1							
Cuprofix + Manzate	2 + 2	1							
Proline* + Manzate	5.7 + 2	1							
Manzate Prostick	2 lb/a	6	$2,407	10396	**292**	**1.6**	35.5	**19.4**	**95.6**
Cuprofix Ultra 40	2 lb/a								
Untreated Check			$2,050	8673	264	51.6	32.3	17.8	95.0

Average	$2,491	10735	291	7.0	36.5	19.4	95.3
LSD 5%	192.5	814.4	12.9	3.0	2.5	0.7	0.5
CV %	8.2	8.1	4.7	45.3	7.3	3.8	0.5

*: Proline applications included Induce (nis) at 0.125%
Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Trials were conducted to determine if 6 closely timed Manzate + Cuprofix applications will provide adequate Cercospora leafspot control in sugarbeets. The leafspot pressure was high in these trials. The standard treatments of Eminent + Manzate followed by, Super Tin + Topsin followed by, Inspire + Manzate followed by, Cuprofix + Manzate followed by, and Proline + Manzate (5 applications) provided slightly better control than the Manzate Copper treatments. However, the multiple Manzate program did provide good Cercospora control at both locations. Manzate Fl appeared to be more effective than Manzate WP, and Cuprofix appeared to be more effective than Kocide 3000 in the trials. It is interesting to note that a standard program with Headline in the place of Inspire, also provided good leafspot control (less effective than Inspire) even though resistance to Headline has been documented in these fields. It appears that the Headline tank mix partner and the fungicides applied before and after Headline, compensated for the reduced efficacy of Headline.

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Cercospora - Multiple Manzate & Cuprofix Applications
Herford, Elkton, MI - 2012
(page 2 of 3)

Trial Quality: Good
Planted: April 2
Harvested: Oct 8
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Previous Crop: Corn
Other Pests: None
Seasonal Rainfall: 20.2 inches
Variety: C-RR824

Rhizoc Control: No Quadris, Fair-Good Control
Applic: Manz + Copper; 55DSV / 10 days Eminent Mix; 55 DSV / 25 DSV

Treatment	Rate	# App	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Manzate + Cuprofix	2 + 1.5	6	**$2,345**	3.5	**10132**	**295**	**34.3**	**19.9**	**94.9**
Manzate + Cuprofix	2 + 3	6	**$2,310**	2.5	**9986**	**293**	**34.0**	**19.8**	**94.7**
Eminent + Manzate	13 + 2	1	**$2,297**	**1.5**	**9972**	**282**	**35.4**	**19.2**	**94.4**
Super Tin + Topsin M	8 + 20	1							
Headline + Manzate	9.2 + 2	1							
Manzate + Cuprofix	2 + 2	1							
Proline + Induce + Manzate	5.7 + .125 2	1							
Eminent + Manzate	13 + 2	1	**$2,278**	**0.6**	**9889**	**281**	**35.2**	**19.1**	**94.5**
Super Tin + Topsin M	8 + 20	1							
Inspire + Manzate	7 + 2	1							
Manzate + Cuprofix	2 + 2	1							
Proline + Induce + Manzate	5.7 + .125 2	1							
Manzate Fl + Cuprofix	1.6 + 1.5	6	**$2,265**	**2.3**	**9794**	**290**	**33.7**	**19.8**	**94.4**
Manzate Fl + Cuprofix	1.6 + 3	6	**$2,232**	**2.0**	**9656**	**287**	**33.6**	**19.6**	**94.3**
Manzate + Kocide 3000	2 + 2	6	**$2,214**	3.9	**9580**	**281**	**34.1**	**19.2**	**94.4**
Manzate + Cuprofix	2 + 2	6	**$2,121**	2.8	**9184**	**281**	**32.7**	**19.0**	**94.7**
Untreated Check		6	$1,538	47.0	6508	232	28.0	16.2	93.8

Average	$2,178	7.3	9411	280	33.4	19.1	94.5
LSD 5%	265.6	1.8	1123.6	17.2	3.3	0.9	0.8
CV %	8.3	17.3	8.1	4.2	6.6	3.3	0.6

Bold: Results are not statistically different from top-ranking treatment in each column
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

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Cercospora - Multiple Manzate & Cuprofix Applications
Sherwood, Breckenridge, MI - 2012
(page 3 of 3)

Trial Quality: Good
Planted: April 11
Harvested: Nov 3
Plot Size: 6 rows X 35 ft, 5 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: B-18RR4N

Soil Info: Clay Loam
2.4% OM, 7.7 pH
Previous Crop: Soybeans

Other Pests: None
Seasonal Rainfall: 22 inches

Rhizoc Control: Quadris.
T-band and 6-8 lf
Good Control
Applic: Manz + Copper;
55DSV / 10 days
Eminent Mix;
55 DSV / 25 DSV

Treatment Name	Rate	# App	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Eminent + Manzate Super Tin + Topsin M Inspire + Manzate Cuprofix + Manzate Proline + Induce + Manzate	13 + 2 8 + 20 7 + 2 2 + 2 5.7 + .125 2	1 1 1 1 1	**$3,056**	**0.1**	**13185**	**310**	**42.2**	**20.3**	**96.2**
Manzate + Cuprofix	1.5 + 3	6	**$2,953**	**0.9**	**12706**	**306**	**41.5**	**20.0**	**96.4**
Manzate + Kocide 3000	2 + 2	6	**$2,842**	**0.7**	**12236**	**310**	**39.4**	**20.2**	**96.6**
Manzate + Cuprofix	2 + 3	6	$2,761	**0.5**	11891	292	**39.3**	19.4	95.7
Manzate + Cuprofix	1.5 + 1.5	6	$2,757	**0.9**	11876	**306**	**39.0**	**20.1**	96.0
Manzate + Cuprofix	2 + 1.5	6	$2,656	**0.6**	11446	**298**	36.9	**19.6**	95.9
Manzate + Cuprofix	2 + 2	6	$2,636	**0.7**	11366	**302**	37.7	**19.8**	**96.3**
Eminent + Manzate Super Tin + Topsin Headline + Manzate Cuprofix + Manzate Proline + Induce + Manzate	13 + 2 8 + 20 9.2 + 2 2 + 2 5.7 + .125 2	1 1 1 1 1	$2,548	**0.2**	11034	282	**39.2**	**18.9**	95.3
Untreated Check			$2,459	55.2	10405	290	35.8	19.1	**96.1**

Average	$2,741	6.7	11794	300	39.0	19.7	96.1
LSD 5%	265.2	4.5	1122.1	13.6	4.0	0.7	0.6
CV %	7.5	52.1	7.3	3.5	8.0	2.7	0.5

Bold: Results are not statistically different from top-ranking treatment in each column.
$/Acre: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Cercospora - Evaluate Strobilurin, Triazole & Super Tin Fungicides for Controlling Cercospora Leafspot in Sugarbeets Average of Trials Conducted from 2008 to 2012 (page 1 of 3)

2008

Treatment	Rate	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Headline	9 fl oz/a	**$1,004**	**0.9**	**6274**	**254**	**24.7**	**17.1**	**95.3**
Inspire SB	7 fl oz/a	**$991**	**0.5**	**6194**	**261**	**23.7**	**17.6**	**95.3**
Gem SC	3.6 fl oz/a	**$987**	**0.7**	**6171**	**253**	**24.3**	**17.2**	**94.9**
Proline SC	5.7 fl oz/a	**$970**	**0.9**	**6065**	**248**	**24.5**	16.9	**94.7**
Eminent	13 fl oz/a	**$949**	**1.0**	**5930**	**253**	23.5	**17.2**	**94.9**
Super Tin	5 oz/a	$936	3.5	5848	**251**	23.3	**17.0**	**95.0**
Untreated		$865	56.5	5408	244	22.2	16.8	**94.4**
Average		$957	5.1	5980	254	23.5	17.2	95.1
LSD 5%		60.7	2.0	379.2	13.5	1.1	0.6	ns(1.0)
CV %		5.5	33.8	5.5	4.6	4.0	3.3	0.9

2010

Treatment	Rate	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire	7 fl oz/a	**$1,835**	**0.4**	**9402**	**278**	**34.5**	**18.6**	**95.4**
Headline	9.2 fl oz/a	**$1,831**	**1.7**	**9379**	**271**	**35.2**	**18.3**	**95.1**
Gem	3.6 fl oz/a	**$1,795**	**2.7**	**9199**	**268**	**34.7**	**18.2**	**94.9**
Eminent	13 fl oz/a	**$1,793**	**0.8**	**9192**	**272**	**34.6**	**18.3**	**95.2**
Proline	5.7 fl oz/a	**$1,766**	**1.4**	**9057**	**266**	**34.6**	**18.2**	94.6
Super Tin	8 fl oz/a	**$1,709**	**3.0**	8694	**272**	**32.7**	**18.3**	**95.2**
Untreated		$1,566	64.5	7831	256	31.0	17.4	**94.9**
Average		$1,757	10.6	8965	269	33.9	18.2	95.0
LSD 5%		132.2	2.8	660.9	12.4	3.6	0.6	0.6
CV %		3.1	10.7	3.0	1.9	4.4	1.4	0.3

Bold: Results are not statistically different from top-ranking treatment in each column.

$/A: Gross payment unless noted by net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The effectiveness of triazole (Inspire, Eminent, Proline, Enable), strobilurin (Headline and Gem) and Super Tin were compared over years. Headline and Gem provided very good Cercospora leafspot control in 2008 (and in previous years) but they started to weaken a little in 2010. In 2011 and 2012, Headline and Gem failed to provide control. Laboratory analysis has determined that the strobilurins have developed resistance to Cercospora leafspot. The triazoles and Super Tin are still providing good Cercospora leafspot control.

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Cercospora - Evaluate Strobilurin, Triazole & Super Tin Fungicides for Controlling Cercospora Leafspot in Sugarbeets Average of Trials Conducted from 2008 to 2012 (page 2 of 3)

2011

Treatment	Rate	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire	7 fl oz/a	**$1,583**	**0.1**	**7256**	**261**	**28.0**	**17.9**	**94.3**
Super Tin	8 fl oz/a	**$1,503**	**0.4**	**6889**	**263**	**26.4**	**18.0**	**94.3**
Eminent	13 fl oz/a	**$1,440**	**0.1**	**6601**	**260**	**25.7**	**17.8**	**94.2**
Gem	3.6 fl oz/a	**$1,400**	**21.3**	**6415**	**256**	**25.3**	**17.7**	**93.9**
Headline	9.2 fl oz/a	**$1,378**	**31.8**	**6315**	**252**	**25.2**	**17.5**	**93.7**
Proline	5.7 fl oz/a	**$1,356**	**0.3**	**6215**	**260**	**24.2**	**17.9**	**94.1**
Untreated		$1,166	**44.7**	5345	**241**	22.0	**16.8**	**93.8**
Average		$1,404	14.1	6434	256	25.3	17.7	94.0
LSD 5%		377.7	ns(60.0)	1731.2	ns(23.1)	5.4	ns(1.2)	ns(0.9)
CV %		11.0	173.7	11.0	3.7	8.8	2.9	0.4

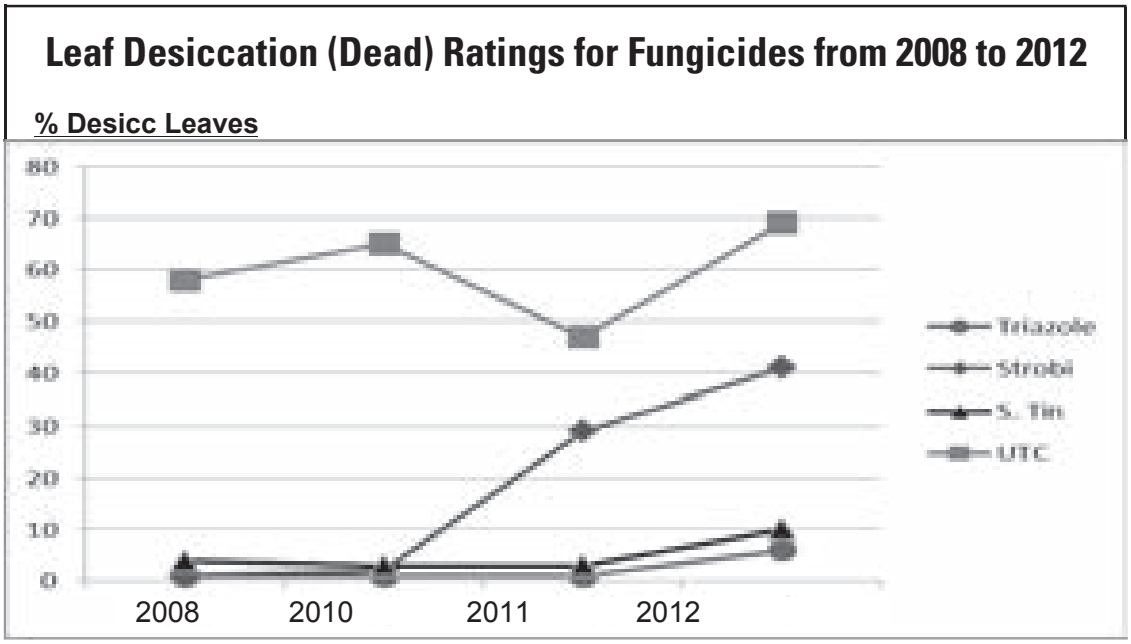
2012

Treatment	Rate	Net $/A	Cerc % Desicc	RWSA	RWST	T/A	% Sugar	% CJP
Inspire	7 fl oz/a	**$2,019**	**2.0**	**8679**	**260**	**33.3**	**17.8**	**94.4**
Eminent	13 fl oz/a	**$1,956**	**11.9**	**8390**	**255**	**33.1**	**17.6**	**94.1**
Proline	5.7 fl oz/a	**$1,919**	**9.1**	**8257**	**255**	**32.5**	**17.5**	**94.2**
Super Tin	8 fl oz/a	**$1,859**	**9.6**	**7982**	**250**	**31.9**	**17.2**	**94.3**
Topsin	20 fl oz/a	$1,721	35.4	**7416**	239	31.0	16.6	93.9
Gem	3.6 fl oz/a	$1,637	35.5	7062	234	30.2	16.4	93.8
Headline	9.2 fl oz/a	$1,559	42.6	6733	227	29.7	16.0	93.5
Untreated		$1,481	67.7	4717	225	27.8	15.8	93.8
Average		$1,769	26.7	7404	243	31.2	16.9	94.0
LSD 5%		171.1	17.4	1558	14.8	1.4	0.9	0.4
CV %		6.6	44.3	14.3	4.2	3.2	3.6	0.3

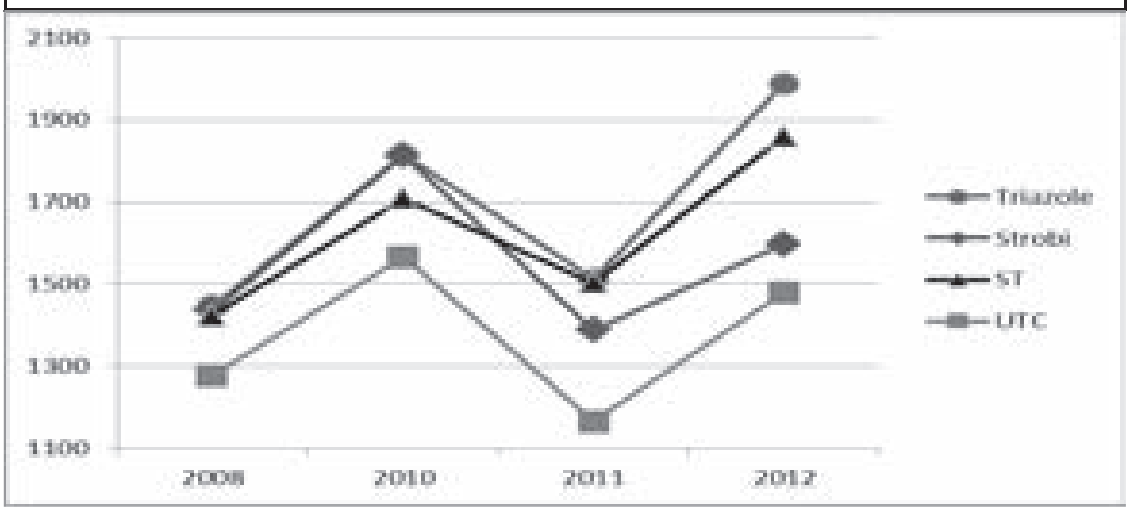
Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted by net. Calculated assuming a $65 payment and an average RWST of 275.

Cercospora - Evaluate Strobilurin, Triazole & Super Tin Fungicides for Controlling Cercospora Leafspot in Sugarbeets Average of Trials Conducted from 2008 to 2012 (page 3 of 3)

Leaf Desiccation (Dead) Ratings for Fungicides from 2008 to 2012



Grower Income from Cercospora Trials from 2008 to 2012



Cercospora - Application Timings Based on BEETcast DSVs & Label Days
Herford, Elkton, MI - 2012
(page 1 of 6)

Trial Quality: Good
Planted: April 2
Harvested: Oct 8
Plot Size: 6 rows X 50 ft, 4 reps
Previous Crop: Corn
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR824
Rhizoc Control: No Quadris
Fair-Good Control
Other Pests: None
Seasonal Rainfall: 20.2 inches

Applic DSV or Days	Actual Timing DSV or Days in ( )	Net $/A	% Desicc	RWSA	RWST	T/A	% Sugar	% CJP
50 / 25	52 27 28 26 18	**$2,550**	**2.0**	**10804**	**305**	**35.5**	**20.3**	**95.4**
50 / Label	52 (16) (10) (8) (12)	**$2,546**	**1.7**	**10785**	**304**	**35.4**	**20.3**	**95.2**
55 / Label	61 (15) (9) (10) (17)	**$2,392**	**3.5**	**10156**	290	**35.0**	19.5	**94.9**
50 / 35	52 34 44 27	$2,352	**7.5**	9850	**299**	**33.5**	**20.0**	**95.2**
60 / Label	63 (13) (9) (10) (17)	$2,285	**3.7**	9693	283	**34.2**	19.2	94.7
60 / 25	63 23 31 22 21	$2,283	**4.5**	9695	284	**34.1**	19.3	94.7
60 / 35	63 36 34 34	$2,280	19.7	9778	**298**	32.8	**20.0**	**95.1**
50 / 45	52 47 40	$2,268	13.8	9682	**293**	33.1	**19.8**	94.7
60 / 45	63 44 44	$2,224	18.5	9542	286	**33.4**	19.2	**95.1**
55 / 55	61 56 50	$2,148	26.7	9302	280	33.1	19.0	94.6
55 / 50	61 46 44	$2,098	29.8	9140	288	31.7	19.4	**94.9**
Scout / Label	95 (14) (7) (10)	$2,027	31.4	8746	278	31.5	18.9	94.5
Scout / 35	95 35 43	$1,959	41.2	8576	275	31.2	18.7	94.6
Scout / 45	95 40	$1,886	52.1	8308	272	30.6	18.4	**95.0**
Scout / 55	95 52	$1,792	52.8	7917	259	30.6	17.9	94.0
Untreated Check		$1,573	87.5	7082	248	28.6	16.9	94.9

Average	$2,166	24.8	9316	284	32.8	19.2	94.8
LSD 5%	176.7	6.4	737.0	13.0	2.2	0.7	0.5
CV %	5.7	18.2	5.5	3.2	4.7	2.6	0.4

Bold: Results are not statistically different from top-ranking treatment in each column.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The 55/40 DSV BEETcast schedule that was recommended in "Red" zones for susceptible varieties, has not provided adequate control the past 2 years. The best timing appears to be starting at about 50 DSVs with repeat applications at 25 DSVs, or by following the pesticide label for re-treatment. Better results can be achieved by applying a protectant, like Dithane or Manzate, about 10 days before the 50 DSV timing but still using the 50 / 25 or label days.

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BEETcast Application Information
Herford, Elkton, MI - 2012
(page 2 of 6)

Treatment	1st Applic			2nd Applic			3rd Applic			4th Applic			5th Applic		
DSV or Days	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date
50 / 25	52		Jul-5	27 / 79	16	Jul-21	28 / 107	13	Aug-3	26 / 133	11	Aug-14	18 / 151	16	Aug-30
50 / 35	52		Jul-5	34 / 86	20	Jul-25	44 / 130	19	Aug-13	27 / 157	17	Aug-30			
50 / 45	52		Jul-5	47 / 99	26	Jul-31	40 / 139	20	Aug-20						
50 / Label Days	52		Jul-5	27 / 79	16	Jul-21	20 / 99	10	Jul-31	18 / 117	8	Aug-8	22 / 139	12	Aug-20
55 / 50	61		Jul-10	46 / 107	24	Aug-3	44 / 151	27	Aug-30						
55 /55	61		Jul-10	56 / 117	29	Aug-8	50 / 167	32	Sept-11						
55 / Label Days	61		Jul-10	25 / 86	15	Jul-25	21 / 107	9	Aug-3	23/130	10	Aug-13	21/157	17	Aug-30
60 / 25	63		Jul-12	23 / 86	13	Jul-25	31 / 117	14	Aug-8	22/139	12	Aug-20	28/167	22	Sept-11
60 / 35	63		Jul-12	36 / 99	19	Jul-31	34 / 133	14	Aug-14	34/167	28	Sept-11			
60 / 45	63		Jul-12	44 / 107	22	Aug-3	44 / 151	27	Aug-30						
60 / Label Days	63		Jul-12	23 / 86	13	Jul-25	21 / 107	9	Aug-3	23/130	10	Aug-13	21/151	17	Aug-30
1st spot / 35	95		Jul-28	34 / 133	18	Aug-14	34 / 167	28	Sept-11						
1st spot / 45	95		Jul-28	40 / 139	24	Aug-20									
1st spot / 55	95		Jul-28	52 / 157	34	Sept-4									
1st spot / Label Days	95		Jul-28	31 / 130	17	Aug-13	9 / 139	7	Aug-20	12/151	10	Aug-30			

Tractor Plot Sprayer, Compressed Air
3 mph, 25 gpa
Plot Size: 11 ft X 50 ft X 4 reps

Cercospora - Application Timings Based on BEETcast DSVs & Label Days
Buckley Creek Farms, Harbor Beach, MI - 2012
(page 3 of 6)

Trial Quality: Good
Planted: April 18
Harvested: Oct 3
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: B-18RR4N

Soil Info: Loam
2.4% OM, 7.9 pH
Previous Crop: Corn

Other Pests: None
Seasonal Rainfall: 16.8 inches

Rhizoc Control: Quadris, T-band and 6-8 lf Good Control

DSV or Label Days	# Apps	Net $/A	% Desicc	RWSA	RWST	T/A	% Sugar	% CJP
65 / 45	3	**$2,189**	**0.1**	**9263**	**276**	**33.5**	**18.5**	**95.6**
1st / 55	2	**$2,170**	**0.1**	**9179**	**275**	**33.4**	**18.3**	**95.8**
55 / 55	3	**$2,168**	**0.1**	**9172**	**279**	**32.8**	**18.6**	**95.6**
75 /55	2	**$2,143**	**0.1**	**9068**	**275**	**33.0**	**18.3**	**95.7**
55 / 45	3	**$2,126**	**0.1**	**8993**	**273**	**33.0**	18.0	**96.1**
55 / Label	5	**$2,124**	**0.0**	**8982**	**279**	**32.2**	**18.5**	**95.8**
55 / 50	3	**$2,120**	**0.0**	**8967**	**275**	**32.6**	**18.3**	**95.5**
65 / 55	2	**$2,091**	**0.0**	**8845**	**279**	**31.8**	**18.5**	**95.8**
65 / Label	5	**$2,088**	**0.0**	**8831**	**280**	**31.5**	**18.5**	**95.9**
1st / Label	4	**$2,069**	**0.0**	**8756**	**279**	31.4	**18.5**	**95.8**
75 / Label	3	**$2,060**	**0.0**	**8715**	**277**	**31.5**	**18.5**	**95.6**
Untreated	0	$2,004	4.8	8477	**272**	31.1	**18.2**	**95.5**
Average		$2,113	0.4	8937	277	32.3	18.4	95.7
LSD 5%		131.4	0.6	556.7	ns(8.3)	2.0	0.5	ns(0.5)
CV %		5.4	126.6	5.4	2.6	5.3	2.2	0.4

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The leafspot pressure was moderate at his location. All of the DSV treatments provided good control, however, we are not ready to make recommendations starting at 1st spot or as late as 75 DSVs.

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BEETcast Application Information
Buckley Creek, Harbor Beach, MI - 2012
(page 4 of 6)

Treatment	1st Applic			2nd Applic			3rd Applic			4th Applic			5th Applic		
DSV or Days	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date
55/45	51		Jul-9	49/100	25	Aug-3	45/145	26	Aug-29						
55/50	51		Jul-9	49/100	25	Aug-3	58/158	34	Sept-6						
55/55	51		Jul-9	56/107	29	Aug-7	51/158	30	Sept-6						
55 / Label Days	51		Jul-9	27/78	16	Jul-25	29/107	13	Aug-7	29/136	17	Aug-24	25/161	18	Sept-11
65/45	63		Jul-17	44/107	21	Aug-7	51/158	30	Sept-6						
65/55	63		Jul-17	62/125	28	Aug-14									
65 / Label Days	63		Jul-17	37/100	17	Aug-3	32/132	17	Aug-20	13/145	9	Aug-29	16/161	13	Sept-11
75/55	71		Jul-21	54/125	24	Aug-14									
75 / Label Days	71		Jul-21	36/107	17	Aug-7	29/136	17	Aug-24						
1st Spot/55	92		Jul-31	53/145	29	Aug-29									
1st Spot/ Label Days	92		Jul-31	40/132	20	Aug-20	13/145	9	Aug-29	16/161	13	Sep-11			

Tractor Plot Sprayer, Compressed Air
3 mph, 25 gpa
Plot Size: 11 ft X 35 ft X 6 reps

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Cercospora - Application Timings Based on BEETcast DSVs & Label Days
Stoutenburg, Sandusky, MI - 2012
(page 5 of 6)

Trial Quality: Very Good
Plot Size: 6 rows X 35 ft, 6 reps
Row Spacing: 20 inch
Variety: B-17RR32

Soil Info: Sandy Clay Loam
3.4% OM, 7.0 pH
Previous Crop: Dry Beans
Other Pests: None
Seasonal Rainfall: 23.0 inches

No.	Treatment DSV or Label	# Apps	Cercospora Infestation	
			% Leaf Desicc	Cerc Rate 0-9
2	55 / 35 and Label Days	5	**0.7**	**2.3**
4	55 / Label Days	5	**0.9**	**2.4**
1	55 / 35	4	**1.2**	**2.5**
7	65 / Label Days	5	**1.5**	**2.6**
10	75 / Label Days	5	**2.0**	2.8
3	55 / 45	3	**5.0**	3.3
5	55 / 55	3	**5.2**	3.3
9	75 / 55	2	**5.3**	3.3
6	65 / 45	3	8.0	3.7
8	65 / 55	3	8.3	3.7
12	85 / Label Days	4	12.0	4.0
14	1st Spot / Label Days	4	22.6	4.8
11	85 / 55	2	26.3	4.9
13	1st Spot / 55	2	33.3	5.3
15	Untreated	0	96.7	8.7

Average	15.3	3.8
LSD 5%	5.6	0.4
CV %	31.8	9.9

Bold: Results are not statistically different from top-ranking treatment in each column.

Summary: Good Cercospora control was achieved in this "Green" zone trial by beginning spray applications at 55 or 65 DSVs, and re-treating at either 35 DSVs, or by label days which are normally around 14 to 21 days. Starting at 75 DSVs provided adequate control if the re-treatment schedule was based on label days, instead of longer DSV timings. Yields were not obtained from this trial. Leafspot pressure was much higher than normal for this area.

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BEETcast Application Information
Stoutenburg, Sandusky, MI - 2012
(page 6 of 6)

Treatment	1st Applic			2nd Applic			3rd Applic			4th Applic			5th Applic		
DSV or Days	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date	DSV	Days	Date
55 / 35	58		Jul-5	33/91	18	Jul-23	29/120	14	Aug-6	52/172	30	Sept-6			
55 / 45	58		Jul-5	41/99	22	Jul-27	43/142	22	Aug-18						
55 / 55	58		Jul-5	56/114	29	Aug-3	58/172	34	Sept-6						
55 / Label Days	58		Jul-5	33/91	18	Jul-23	29/120	14	Aug-6	22/142	12	Aug-18	30/172	19	Sept-6
65 / 45	65		Jul-9	49/114	25	Aug-3	40/154	24	Aug-27						
65 / 55	65		Jul-9	55/120	28	Aug-6	52/172	30	Sep-6						
65 / Label Days	65		Jul-9	34/99	25	Jul-27	37/136	17	Aug-13	18/154	14	Aug-27	27/181	23	Sept-20
75 / 55	77		Jul-17	59/136	27	Aug-13									
75 / Label Days	77		Jul-17	43/120	20	Aug-6	22/142	12	Aug-18	12/154	9	Aug-27	27/181	23	Sept-20
85 / 55	91		Jul-23	51/142	26	Aug-18									
85 / Label	91		Jul-23	45/136	21	Aug-13	18/154	14	Aug-27	27/181	23	Sept-20			
1st spot / 55	106		Jul-31	66/172	37	Sept-6									
1st spot Label Days	106		Jul-31	36/142	19	Aug-18	12/154	9	Aug-27	27/181	23	Sept-20			

Tractor Plot Sprayer, Compressed Air
3 mph, 25 gpa
Plot Size: 11 ft X 50 ft X 6 reps

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Cercospora - Evaluate an Early Season Application of Manzate in a Cercospora Spray Program
Bach & Pigeon - 2012

Trial Quality: Good
Plant/Harvest: Normal Range
Plot Size: 100 ft X 1000 ft, 4 to 6 reps
Varieties: Susceptible

Soil Info: Normal for area
Other pests: Not significant
Rhizoc Control: Good
Seasonal Rain: about 22.0 inches

Treatment	# Applic	Rate	Cerc % desicc
Early Manzate application followed by	1	2 lb/a	**0.8**
Normal Spray Program	3 or 4	label rates	
Normal Spray Program	3 or 4	label rates	4.3

Average	2.5
LSD 5%	1.1
CV %	35.6

Bold: Results are not statistically different from top-ranking treatment in each column

Summary: Two growers were provided Manzate to apply approximately 10 days before the normal Cercospora spray program began. The addition of the early Manzate treatment improved Cercospora control significantly. Sugarbeet yields were not obtained, however, yield losses generally occur when there is 3% or more leaf desiccation.

Cercospora Leaf Spot: Application Timings, Water Volume & Spray Programs

Kent County, Ontario, Canada
Cheryl Trueman, University of Guelph, Ridgetown Campus

Objective: Determine the influence of application water volume and fungicide application timing on Cercospora leaf spot severity using fungicide programs with and without Headline (pyraclostrobin).

Methods:

Trial Quality:	Fair	**Variety:**	C-RR824	**Row Spacing:**	2.5 feet
Location:	Ontario, Canada	**Seeding Rate:**	10 seeds/foot	**Application Method:**	hand-held boom, CO_2 pressure
Planted:	March 22	**Plot Size:**	3 rows x 23 feet	**Application Water Volume:**	12.1 or 24.7 gal/A
Harvested:	August 23	**Reps:**	4		

Table 1. Spray programs, target and actual application timings of fungicides. All treatments were applied at 12.1 and 24.7 gal/A.

Fungicide Program		Application Timing [a]					
		BEETcast 50/35/35/35/35		BEETcast 55/50/50/50/50		Calendar – based on product labels	
Headline Included	No Headline Included	Target	Actual	Target	Actual	Target	Actual
Proline + Manzate Pro-Stick	Proline + Manzate Pro-Stick	50 DSV	40 DSV	55 DSV	47 DSV	Symptoms	June 20
Headline + Manzate Pro-Stick	Senator + Manzate Pro-Stick	85 DSV	76 DSV	105 DSV	102 DSV	21 days later	20 days later (July 10)
Proline + Manzate Pro-Stick	Proline + Manzate Pro-Stick	120 DSV	107 DSV	155 DSV	n/a [b]	14 days later	15 days later (July 25)
Senator + Manzate Pro-Stick	Manzate Pro-Stick	155 DSV	145 DSV	210 DSV	n/a	21 days later	n/a [b]
Manzate Pro-Stick	Manzate Pro-Stick	190 DSV	n/a	265 DSV	n/a	14 days later	n/a

[a] Final DSV accumulation on harvest date (Aug 23) was 162. First application for calendar program and BEETcast 50/35/35/35/35 was made on June 20. First application for BEETcast 55/50/50/50/50 was applied on June 25. Symptoms were first observed in the trial on June 18.

[b] Not applied because of close proximity to harvest date.

Results:

Cercospora leaf spot symptoms were first observed in the trial on June 18, when 40 DSVs had accumulated at the site. All fungicide programs resulted in lower DSI and AUDPC than the nontreated control on all dates except July 5 (Table 1). Disease severity and AUDPC were lower in the BEETcast 50/35 and calendar spray programs than the BEETcast 50/50 on Aug 15 and 23. There were no differences in disease severity and AUDPC for spray program or the application water volume. There were no differences among treatments for total yield or mean beet weight, and none of the fungicide programs had higher yield than the nontreated control.

Cercospora Leaf Spot: Application Timings, Water Volume & Spray Programs (continued)

Table 1. Area under the disease progress curve and yield for Cercospora leaf spot on sugarbeets treated with different fungicide programs, fungicide application timings, and fungicide application water volumes, Kent County, Ontario, 2012.

Factor [a]	AUDPC [b]	Total Yield (T/A) [c]
Nontreated Control	1335	34.3
Program		
Headline	434 ns	37.7 ns
No Headline	434	37.7
Application Timing		
BEETcast 50/35/35/35	**391 b**	38.0 ns
BEETcast 55/50	**614 a**	36.6
Calendar Spray (3 applications)	**298 b**	38.6
Water Volume		
12.1 gal/A	438 ns	37.8 ns
24.7 gal/A	431	37.6

[a] Control data included for reference only. All fungicide treatments had lower AUDPC than control plots and all fungicide treatments had yield equivalent to the nontreated control (Dunnett's test, $P \leq 0.05$).
[b] The area under the disease progress curve (AUDPC) was calculated using disease severity ratings completed on July 5, 31, Aug 15, and 23. Lower AUDPC indicates less disease.
[c] Numbers in a grouping following by the same letter are not significantly different (Tukey's adjustment, $P \leq 0.05$). ns = not significant.

Summary:
- Application timings following BEETcast 50/35 and the calendar spray program based on product label intervals provided better disease control than the BEETcast 55/50 program. Disease progress was relatively slow during the season because of hot and dry weather. In addition, the trial was located in a field that ended up being scheduled for early harvest. We may have seen a greater spread among factors tested had the trial been continued into October or early November and this should be considered in future years.
- Sugar samples were lost in transit. The lack of sugar results limits our interpretation of the results. We can only extrapolate from previous work that demonstrates higher disease severity results in sugar losses, however, it is not possible to determine if any of the management methods tested was more or less economical than another.
- Rhizoctonia crown and root rot incidence was high in some plots. This may have impacted yield results because of missing plants in the harvested area may have resulted in lower than expected yield per area, and overcompensation of growth by nearby plants may have resulted in higher than expected per beet weight.

Funding:
This research was supported by the Ontario Sugarbeet Growers' Association.

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Evaluate Jumpstart to Improve Sugarbeet Emergence
Shaffner, Freeland, MI - 2012

Trial Quality: Very Good
Planted: May 18
Harvested: Oct 17
Plot Size: 4 rows X 114 ft, 5 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Soil Info: Silty Clay 2.9% OM, 7.7 pH
Previous Crop: Dry Beans
Other Pests: Low level Cyst Nematodes
Seasonal Rainfall: 21.5 inches

Cercospora Control: 4 Appl Good Control
Rhizoctonia Control: 0 Apps Very Little Rhizoc
Variety: C-RR086

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Stand Beets/100 ft May 25	Jun 6	Jun 28	Aug 7
Jumpstart	**$1,876**	**8326**	**295**	**28.3**	**19.7**	**95.2**	**109**	**234**	**223**	**244**
No Jumpstart	**$1,873**	**8310**	**294**	**28.3**	**19.8**	**94.8**	**107**	**230**	**231**	**242**
Average	$1,874	8318	294	28.3	19.8	95.0	108	232	227	243
LSD 5%	ns(167.2)	ns(742)	ns(11.8)	ns(1.6)	ns(0.7)	ns(0.9)	ns(73)	ns(32)	ns(21)	ns(42)
CV %	4.0	4.0	1.8	2.5	1.5	0.4	30.0	6.1	4.0	7.7

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: JumpStart is a microbial seed inoculant designed to increase the availability of Phosphorus to the plant. Responses have been reported in soils low in Phosphorus. JumpStart did not increase sugarbeet emergence, yield or quality in this trial.

Metlock Suite Seed Treatment
Nancy Schutte, Pigeon, MI - 2012

Trial Quality:	Good	**Seed Rate:**	62,000	**Rhizoc Control:**	Excellent Control: Quadris at 6-8 Leaf
Variety:	SX-1281RR	**Soil Info:**	Loam		
Planted:	April 14	**Fertilizer:**	Preplant: 460# of 18-0-26 + micros, 2x2: 30# of N, Fall: Manure	**Cerc Control:**	Excellent Control: 1. Eminent, 2. Headline + Kocide, 3. Proline
Harv/Samp:	Nov 5/Oct 8				
Plot Size:	5 rep				
Row Spacing:	20 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft of Row	
							11 Day	23 Day
Check	—	**14011**	**321**	**43.8**	**21.2**	**95.6**	**36**	**228**
Metlock Suite	—	**13239**	**320**	**41.6**	**21.2**	**95.5**	**29**	**228**
LSD 5%	—	ns (1383)	ns (9)	ns (3.3)	ns (0.6)	ns (0.5)	ns (23)	ns (12)
CV%	—	6	2	4.4	2.0	0.4	54	4

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Metlock (Metconazole) is a new systemic seed treatment for sugarbeets that may increase seedling disease control on Rhizoctonia and Fusarium. Metlock was applied in addition to standard seed treatments of Apron XL and Thiram. In this trial, it was compared to the Apron/Thiram standard treatment. Seedling disease was almost non-existent. Metlock did not affect emergence. In the absence of seedling disease the addition of Metlock treatment had no effect on yield.

Metlock Suite Seed Treatment
Loren & Josh Humm, Breckenridge, MI - 2012

Trial Quality:	Fair - Good	**Seed Rate:**	56,000	**Rhizoc Control:**	Good Control: 2-4 & 6-8 Leaf
Variety:	SX-1281RR	**Soil Info:**	Loam		
Planted:	April 10	**Fertilizer:**	2x2: 20 gal of 10-18-6, PPI: Urea - 100# of N, 200# of K2O	**Cerc Control:**	Good Control: 1. Inspire XT + EBDC, 2. Eminent + EBDC, 3. Kocide 3000
Harv/Samp:	Sep 26/Sep 25				
Plot Size:	4 rep				
Row Spacing:	28 inch	**Prev Crop:**	Corn	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft of Row	
							16 Day	28 Day
Check	—	**6646**	**239**	**27.3**	**16.7**	**93.9**	**43**	150
Metlock Suite	—	6197	**229**	**27.7**	**16.1**	**93.5**	**40**	**178**
LSD 5%	—	335	ns (31)	ns (1.5)	ns (1.6)	ns (1.3)	ns (8)	25
CV%	—	2	8	2.5	5.5	0.8	13	10

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Metlock (Metconazole) is a new systemic seed treatment for sugarbeets that may increase seedling disease control for Rhizoctonia and Fusarium. Metlock was applied in addition to standard seed treatments of Apron XL and Thiram. In this trial, it was compared to Apron/Thiram standard treatment. Trial emergence was slow due to heavy crop residue and dry conditions. There was a low amount of seedling disease observed. Metlock treatment appeared to give a better final emergence. No significant differences between treatments in tonnage or quality. It visually appeared that there was a high amount of variation in the trial. RWSA appears to be significant, but it may not be due to seed treatment difference, but field variation.

VOTiVO Seed Treatment
Helmreich Farms LLC, Freeland, MI - 2012

Trial Quality:	Good	**Seed Rate:**	50,000	**Rhizoc Control:**	Good Control: In Furrow & 8-10 Leaf
Variety:	C-RR074NT	**Soil Info:**	Loam		
Planted:	April 10	**Fertilizer:**	Total Applied: 125-40-60	**Cerc Control:**	Good Control: 1. Inspire XT + EBDC, 2. Headline + EBDC
Harv/Samp:	September 25				
Plot Size:	5 reps				
Row Spacing:	30 inch	**Prev Crop:**	Soybeans	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft of Row	
							21 Day	30 Day
VOTiVO	—	**6709**	**274**	**24.3**	**18.1**	**96.3**	**198**	**243**
Check	—	**6526**	**277**	**23.6**	**18.2**	**96.6**	**200**	**238**
LSD 5%	—	ns (772)	ns (8)	ns (2.9)	ns (0.5)	ns (0.6)	ns (19)	ns (12)
CV%	—	7	2	6.9	2.0	0.4	6	3

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: VOTiVO seed treatment employs a biological mode of action with a unique bacteria strain that lives and grows with young roots, creating living bacteria that may help prevent nematodes from causing damage. Seed treatment was put on a nematode tolerant variety and compared to standard seed treatment. Both treatments were from the same seed lot. Trial was located in a known nematode infested field. No visual differences were seen during the growing season and no significant yield or quality differences were measured.

Seedling Disease in Michigan

Linda Hanson, Tom Goodwill, and Mitch McGrath USDA-ARS

Sugar beet seedlings (24 entries of a larger genetic population constructed to dissect Rhizoctonia disease reaction in sugar beet) were screened for their response to a highly virulent isolate of *Rhizoctonia solani* AG 2-2. Seedlings were grown to the two-leaf stage in the greenhouse, thinned to 15 plants per row, and inoculated with a preparation of *R. solani* in ground sterile barley, watered well, and maintained in the greenhouse for an additional three weeks. Plants were removed from the soil, washed gently in tap water, and rated for damping-off using a 0-5 scale, where 0=no symptoms and 5= dead plant with completely rotted root (Figure 1). Missing plants were rated as 5. A weighted Disease Index was calculated for each of the 24 entries based on the number of plants in each disease category relative to the total number of plants (Table 1). Germplasm varied for response to AG-2-2, indicating this trait is segregating in this population. Previously, we discovered EL51 has resistance to seedling Rhizoctonia damping-off. The tested germplasm was derived from a cross between EL51 and a susceptible parent. Three of the tested lines had lower disease indices than EL51, suggesting improvement in seedling Rhizoctonia resistance is possible.

RIL	Disease Index
EL-A026317	1.7
EL-A023684	2.5
EL-A023789	2.5
EL51	2.7
EL-A023708	3.1
EL-A026283	3.2
EL-A023644	3.3
EL-A023665	3.3
EL-A023689	3.3
EL-A026149	3.4
EL-A023751	3.5
EL-A026513	3.5

RIL	Disease Index
EL-A023678	3.7
EL-A025720	3.7
C869	3.8
EL-A023806	3.8
EL-A025946	3.9
EL-A023762	3.9
EL-A026320	3.9
EL-A023605	4.0
EL-A026511	4.1
EL-A023882	4.4
EL-A023781	4.5
EL-A023579	4.6

Table 1: Response of seedlings of East Lansing germplasm to a highly virulent isolate of *Rhizoctonia solani* AG 2-2. Disease Index from a 0-5 rating scale, 0=no symptoms.

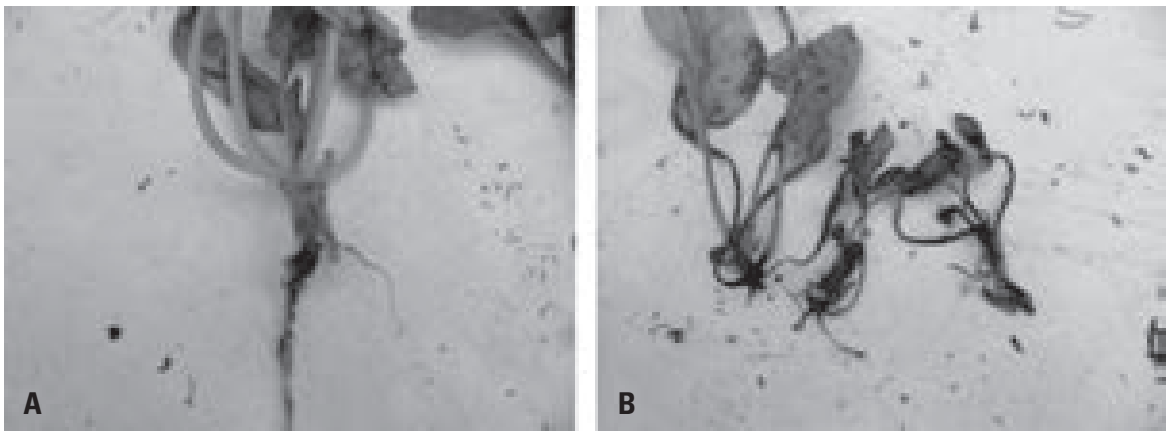

Figure 1: Beet seedlings showing different severity levels three weeks after inoculation with a highly virulent *R. solani* isolate. A – low severity B – Severity rating 5.

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Insect Control in Sugarbeets with Mustang Max Shelter, Bay Port, MI - 2012

Trial Quality: Poor
Planted: April 17
Harvested: Sept 17
Plot Size: 6 rows X 35 ft, 12 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: C-RR074NT

Soil Info: Clay Loam
16.8% OM, 7.6 pH
Previous Crop: Sod
Other Pests: White Grubs
Seasonal Rainfall: 20.0 inches

Rhizoc Control: 0 Applic,
Very little Rhizoc
Cercospora Control: 3 Applic,
Good Control

Treatment	Rate	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP
Mustang Max	4 fl oz/a	**$1,100**	**4695**	**172.9**	**27.2**	**13.2**	**91.0**
Untreated Check		**$1,044**	**4418**	**172.5**	**25.6**	**13.1**	**91.0**
Average		$1,072	4557	172.7	26.4	13.1	91.0
LSD 5%		ns(171)	ns(723)	ns(9.6)	ns(3.6)	ns(0.5)	ns(0.8)
CV %		17.8	17.7	6.2	15.0	3.9	0.9

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: This trial was designed to evaluate Mustang Max for insect control in sugarbeets. The treatments were applied in-furrow at planting. There were a few white grubs present and no other noticeable insects. There was no advantage to the Mustang Max treatment at this location. Mustang Max did not appear to reduce sugarbeet stand or cause stunting.

Nematode Strip Trial
Kirkpatrick, Deckerville, MI - 2012
(page 1 of 2)

Trial Quality: Good
Planted: May 22
Harvested: Sept 24
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Previous Crop: Corn
Other Pests: Mod-high level of Cyst Nematodes
Seasonal Rainfall: 19.0 inches

Rhizoc Control: 2 Appl Good Control
Cercospora Control: 3 Applic. Good Control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
C-RR074NT	**$1,003**	**4245**	**222.5**	**19.1**	**15.3**	**94.9**
C-RR827	$427	1805	207.2	8.7	14.5	94.2
Average	$715	3025	214.9	13.9	14.9	94.6
LSD 5%	86.2	364.7	4.1	1.6	0.2	0.2
CV %	6.9	6.9	1.1	6.4	0.9	0.1

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: In this field with a moderate to high level of sugarbeet cyst nematodes, the nematode tolerant variety yielded more than twice as much as the standard variety. Sugar content was also significantly higher with the nematode tolerant variety.

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Nematode Strip Trial
Maust, Bay Port, MI - 2012
(page 2 of 2)

Trial Quality: Good
Planted: May 14
Harvested: Sept 19
Plot Size: 6 rows X 300 ft, 4 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Soil Info: Loam
3.6% OM, 5.9 pH
Previous Crop: Soybeans
Other Pests: Low-moderate level of Cyst Nematodes
Seasonal Rainfall: 20.2 inches

Rhizoc Control: Quadris, T-band and 6· Good Control
Cercospora Control: 3 Apps Good Control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Stand July 9 B/100'	Stand Aug 8 B/100'
C-RR074NT	**$1,513**	**6401**	**213**	**30.1**	**15.2**	**93.0**	**183**	**169**
C-RR827	**$1,460**	**6178**	**206**	**29.9**	**14.8**	**93.2**	141	135
Average	$1,487	6290	210	30.0	15.0	93.1	162	152
LSD 5%	ns(376)	ns(1593)	ns(12.7)	ns(6.1)	ns(0.8)	ns(0.8)	11.2	30.8
CV %	8.3	8.3	2.0	6.7	1.9	0.3	3.1	9.0

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: This field had a lower level of sugarbeet cyst nematodes. There was no difference in RWSA or RWST between the two varieties. There was a better stand in the nematode tolerant variety, C-RR074NT.

Clover Cover Crop Trial
Schindler Farms LLC, Kawkawlin, MI - 2012

Trial Quality:	Excellent	**Seed Rate:**	61,000	**Rhizoc Control:**	Fair-Good Control: In Furrow & 6-8 Leaf
Variety:	B-19RR1N	**Soil Info:**	Loam		
Planted:	April 4	**Fertilizer:**	2x2: 15 gal of 21-12-0 + micros, Broadcast: 142# of N, Fall: 120# of K2O + boron	**Cerc Control:**	Good Control: 1. Inspire XT + EBDC, 2. Headline + EBDC, 3. Enable + EBDC
Harv/Samp:	Sept 24/Sept 20				
Plot Size:	4 rep				
Row Spacing:	22 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft 34 Day	Dead Beets /1200 Ft.
Clover	$2,045	**8639**	**263**	**32.9**	**17.6**	**95.5**	**177**	**41**
Check	$1,875	7934	**275**	28.8	**18.2**	**96.0**	**170**	**104**
LSD 5%	—	510	ns (35)	4.0	ns (1.7)	ns (1.5)	ns (26)	ns (67)
CV%	—	3	6	5.7	4.2	0.7	7	41

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Clover strips were frost seeded in wheat in early spring of 2011. The clover established well and had excellent growth in 100+ bushel wheat. Clover/wheat stubble was chisel plowed in late fall. Sugarbeets were planted spring of 2012. N-P-K fertilizer application was the same for clover and non-clover strips. Trial was evaluated for yield, quality, and Rhizoctonia levels. Rhizoctonia counts taken in late summer appear to indicate a reduction in Rhizoctonia where beets were planted in clover strips. RWSA and tonnage were significantly higher in the clover strips. However, sugarbeet quality (% sugar and CJP) trended lower in clover strips. Clover can supply 40-80 pounds of additional nitrogen through the growing season. Generally nitrogen rates should be reduced by at least 40 pounds of nitrogen per acre if planting into clover. A soil nitrate test at sidedress time may be helpful in determining needs. Excessive application of nitrogen or late season release of nitrogen will reduce quality.

Clover Cover Crop Trial
Gene Meylan, Linwood, MI - 2012

Trial Quality:	Good	**Seed Rate:**	48,000	**Rhizoc Control:**	Fair-Good Control: In Furrow Alone
Variety:	B-19RR1N	**Soil Info:**	Loam		
Planted:	April 11	**Fertilizer:**	2x2: 36-33-0 + micros, Sidedress: 84# of N, Fall: 120# of K2O, 2 ton of lime	**Cerc Control:**	Good Cont: 1. Eminent + EBDC, 2. Inspire XT + Headline, 3. Eminent + EBDC
Harv/Samp:	Oct 11/Nov 6				
Plot Size:	4 rep				
Row Spacing:	30 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets/ 1200 Ft.
Check	$2,249	**9515**	**305**	**31.2**	**20.2**	**95.7**	**126**
Clover	$2,230	**9436**	288	**32.8**	19.3	95.1	**65**
LSD 5%	—	ns (1442)	8	ns (4.4)	0.5	0.5	ns (221)
CV%	—	7	1	6.2	1.2	0.2	103

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Clover strips were frost seeded in wheat in early spring of 2011. The clover established well and had excellent growth. Clover/wheat stubble was chisel plowed in late fall. Sugarbeets were planted in the spring of 2012. N-P-K fertilizer application was the same for clover and non-clover strips. Trial was evaluated for yield, quality, and Rhizoctonia levels. Rhizoctonia counts taken in late summer appear to indicate a reduction in Rhizoctonia where beets were planted in clover strips. Tonnage also trended higher in clover strips. However, sugarbeet quality (RWST, % sugar and CJP) was significantly lower in clover strips. Clover can supply 40-80 pounds of additional nitrogen through the growing season. Generally nitrogen rates should be reduced by at least 40 pounds of nitrogen per acre if planting into clover. A soil nitrate test at sidedress time may be helpful in determining needs. Excessive application of nitrogen or late season release of nitrogen will reduce quality.

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Cover Crop Trial
Burk Farms, Bay City, MI - 2012

Trial Quality:	Good	**Seed Rate:**	52,000	**Rhizoc Control:**	Good Control: Quadris In Furrow & 6-8 Leaf
Variety:	C-RR824	**Soil Info:**	Loam		
Planted:	March 25	**Fertilizer:**	Fall: 150# of K2O, 2x2: 27-40-0 + micros, Sidedress: 75# of N	**Cerc Control:**	Poor Control: 1.Eminent, 2. Headline + EBDC
Harv/Samp:	Oct 10/Oct 3				
Plot Size:	3 reps				
Row Spacing:	30 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Groundbreaker Radish	$2,321	**9790**	**285**	**34.4**	**19.1**	**95.3**
Red Clover	$2,198	**9293**	254	**36.6**	17.7	93.6
Groundhog Radish	$2,185	**9246**	**284**	**32.6**	**19.1**	**95.1**
Sudex	$2,056	**8700**	**283**	**30.7**	**19.1**	**95.0**
Average	$2,190	9257	277	33.6	18.8	94.7
LSD 5%	—	ns (1146)	13	ns (5.1)	0.6	0.6
CV%	—	6	2	7.5	1.6	0.3

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was conducted by Paul Gross, Cover Crop Educator MSUE, to evaluate the impact that cover crops planted after wheat have on sugarbeets. Cover crops were chisel plowed in the fall and were followed by sugarbeets in the spring. Clover, as the previous crop, had the highest yield trend, but also had the lowest sugar content. Excess nitrogen levels from clover and applied nitrogen can reduce quality. The applied nitrogen in this trial wouldn't be considered excessive, but the clover still impacted quality. Oilseed radish varieties Groundbreaker and Groundhog are promoted as tillage radishes to loosen soil and trap nitrogen. Both varieties are not recommended in the sugarbeet growing area because they will increase Sugarbeet Cyst Nematode levels. Varieties that are nematode trap crops and are recommended for sugarbeet productions areas are Defender, Adagio, and Colonel. These radish varieties will give similar soil benefits as tillage radish. Sudex cover crop trended to give the lowest sugarbeet yields. Sudex residue is similar to corn stalks and additional nitrogen may have been needed.

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Narrow Row Research
Evaluate the Influence of Row Spacing (22" vs. 30") on Sugarbeet Yield, Quality & Grower Income
4 Year Summary (10 Trials from 2009 to 2012)

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Row Close
22"	**$1,775**	**7508**	**259**	**28.7**	**17.8**	**94.3**	**87.1**
30"	$1,506	6372	250	25.1	17.3	**94.1**	68.6
Average	$1,640	6940	255	26.9	17.5	94.2	77.8
LSD 5%	88.4	373.8	4.3	1.2	0.2	ns(0.3)	6.1
CV %	5.0	5.0	1.6	4.3	1.1	0.3	7.2
22" Increase	**$269**	**1136**	**9.0**	**3.6**	**0.5**	**0.2**	**18.5**

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Michigan Sugar Company has conducted 10 trials from 2009 to 2012 evaluating the effect of narrow row (22 inch) sugarbeet production on yield, quality and grower income. Sugarbeet yield and quality was higher with narrow rows in each trial. On average, yields were increased by 3.6 tons per acre while the sugar level was increased by 1/2 point. It appears that narrow rows increase yields by allowing for more beets per acre, and by covering the soil more quickly with leaves so that more sunlight is intercepted. Grower income was $269 higher in narrow rows when averaged over the 10 trials.

Research conducted by Michigan State University and replicated strip trials conducted by Sugarbeet Advancement, have recorded similar results. Most sugarbeets produced in other regions are grown in narrow rows.

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Narrow Row Research
Evaluate the Influence of Row Spacing (22" vs. 30") on Sugarbeet Yield, Quality & Grower Income
Average of 2 Locations, Breckenridge, MI - 2012

Trial Quality: Good
Planted: Crumbaugh - April 5
English - April 24
Harvested: Crumbaugh -
Oct 22, English - Oct 29
Plot Size: 6 rows X 114 ft, 6 reps
Seeding Rate: 4.1 inches
Variety: Crumbaugh, HM-27RR and English, HM-28RR

Soil Info: Crumbaugh - Loamy Sand, 1.9% OM, 6.9 pH
English - Clay Loam 3% OM, 7.5 pH
Previous Crop: Crumbaugh -Soybeans
English - Wheat
Other Pests: Minor nematodes at one location
Seasonal Rainfall: About 20 inches

Rhizoc Control: 1 Applic Good control
Cerc Control: 4 Applic Good control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Amino	% Row Close Aug 2	% Row Close Jun 22
22"	**$2,048**	**8664**	**289**	**30.0**	**19.3**	**95.4**	2.2	**78.9**	**61.7**
30"	$1,690	7148	280	25.6	18.8	**95.1**	**3.1**	52.1	35.2
Average	$1,869	7906	284	27.8	19.0	95.3	2.6	65.5	48.5
LSD 5%	123.1	520.7	6.4	1.7	0.3	ns(0.3)	0.7	4.3	7.2
CV %	6.9	6.9	2.4	6.4	1.7	0.4	27.5	7.0	12.9

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: The trials were located 3 miles north of Breckenridge (Crumbaugh) and about 5 miles southeast of Breckenridge (English). The sugarbeet population was approximately 30,000 beets per acre for both locations and row spacings. The 22" row treatments out yielded the 30" row treatments by 4.4 tons per acre. Sugar levels were about 1/2 point higher in the narrow row plots.

Row Width Trial
Mowry Farms, Akron, MI - 2012

Trial Quality:	Excellent	**Seed Rate:**	30"- 52 K; 22"- 62 K	**Rhizoc Control:**	Good Control: Both In Furrow & 6-8 Leaf
Variety:	C-RR074NT	**Soil Info:**	Loam		
Planted:	Late March	**Fertilizer:**	PPI: 40 gal 28% + 8 gal of 10-34-0 + 3 gal of thiosul + micros	**Cerc Control:**	Excellent Control: 1. Proline, 2. Super Tin + EBDC, 3. Insire XT, 4. Headline, 5. Eminent
Harv/Samp:	Nov 6/Oct 17				
Plot Size:	2 reps				
Row Spacing:	See Treatments	**Prev Crop:**	Corn	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Population
22 Inch Rows	$3,546	**15004**	**338**	**44.4**	**22.2**	**95.8**	**219**
30 Inch Rows	$3,122	13202	**332**	39.8	**21.9**	**95.7**	**231**
LSD 5%	—	635	ns (36)	1.9	ns (2.3)	ns (0.1)	ns (15)
CV%	—	0	1	0.4	0.8	0.0	4

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was established to compare yield and quality differences of standard 30 inch to 22 inch row width sugarbeets. At planting time a block of 64 rows of narrow row beets were established in a field of 30 inch rows. All fertilizer was broadcast applied in both 22 and 30 inch rows. At planting 30 inch rows population was 52,000 per acre (4 inch seed spacing), 22 inch rows were planted at 62,000 populations (4 ½ inch seed spacing). Established population of 30 inch rows was 40,000 and 22 inch was 52,000 plants per acre. Six strips were harvested inside the block of narrow rows and 6 strips were harvested in the wide rows on each side of the narrow block. All six narrow row strips, without exception, out yielded the wide rows by more than 4 tons and trended towards improved quality. The data indicates even under a high yield environment, narrow rows can significantly improve yields and profitability when compared to conventional row widths.

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Soil Fertility
Evaluate Starter Fertilizer (N & P) Applied 2x2 at Planting
Crumbaugh Farm, Breckenridge, MI - 2012

Trial Quality: Very Good
Planted: March 29
Harvested: Oct 26
Plot Size: 6 rows X 114 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches
Variety: HM-28RR

Soil Info: Loamy Sand 1.9% OM, 6.9 pH
Previous Crop: Soybeans
Other Pests: Minor Cyst Nematodes
Seasonal Rainfall: 22 inches

Rhizoc Control: Quadris, T-band and 6-8 lf Good Control
Cercospora Control: 4 Applic Good Control

Treatment Name	Rate	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Canopy % Close Jun 15	Canopy % Close Jul 20	Stand B/100 May 10
Nitrogen (12 gal UAN 28%)	36 lb ai/a	**$2,172**	**9866**	**292**	**33.8**	**19.3**	**95.8**	**72**	**93**	**225**
Nitrogen (7 gal 10-34-0)	8.4 lb ai/a									
P_2O_5 (7 gal 10-34-0)	27.6 lb ai/a									
No Starter		$2,029	9016	**285**	31.6	**19.0**	**95.6**	55	**87**	**221**
Average		$2,101	9441	289	32.7	19.2	95.7	63	90	223
LSD 5%		122.6	545	ns(25)	1.2	ns(1.5)	ns(0.5)	7.2	ns(7)	ns(11)
CV %		1.7	1.6	2.5	1.1	2.3	0.1	3.2	2.3	1.3

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Sugarbeets were planted with and without starter fertilizer in this small plot replicated trial. The starter treatment had no effect on sugarbeet emergence. The 2x2 starter treatment (12 gal UAN 28% and 7 gal 10-34-0) provided a significant increase in early season root and canopy development, also in final yield and grower income.

Lime Trials - Evaluate Sugarbeet Yield, Quality, Emergence, Disease Level & Soil pH Following Applications of Factory Lime Average of 3 Trials Conducted in 2012 (page 1 of 5)

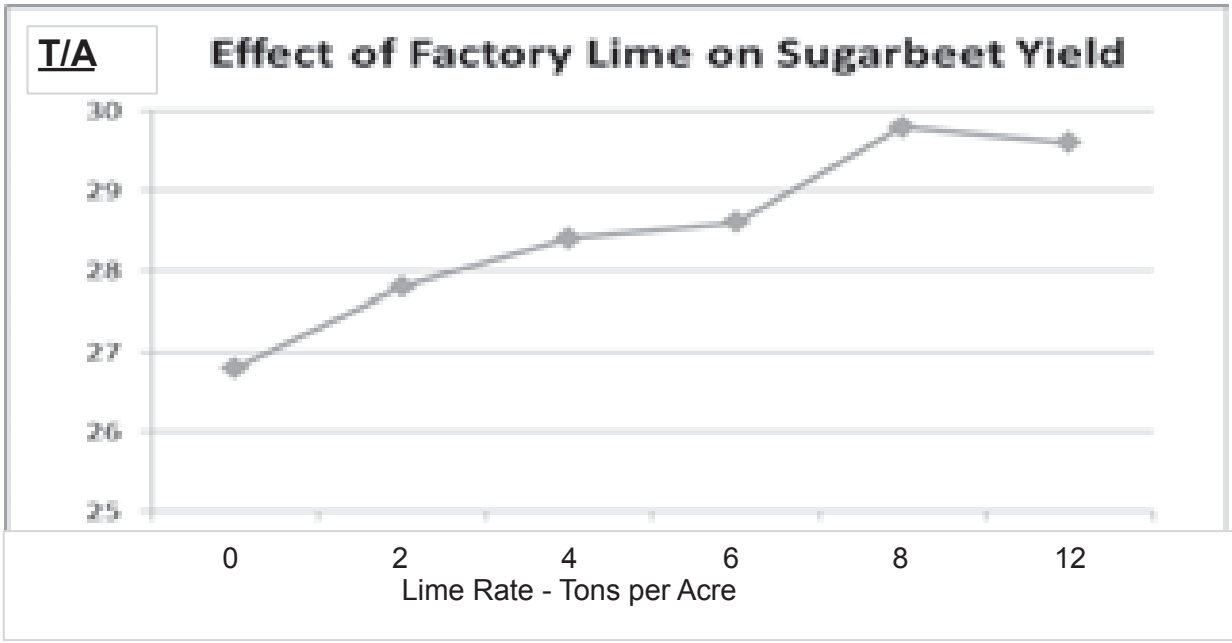
Tons Lime/ Acre	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Stand B/100'	Dead B/100'	Nov 2011 pH	Jul 2012 pH	Change pH
12	**$2,053**	**8820**	**295**	**29.6**	**19.4**	**96.2**	**203**	**1.1**	**7.7**	**7.9**	**0.3**
8	**$2,053**	**8780**	**293**	**29.8**	**19.3**	**96.1**	**208**	**0.7**	**7.7**	**7.7**	**0.1**
6	**$1,987**	**8478**	**294**	**28.6**	**19.3**	**96.2**	**205**	**0.6**	**7.7**	**7.9**	**0.2**
4	**$1,971**	8396	**293**	28.4	**19.3**	**96.1**	**206**	**1.2**	**7.7**	**7.7**	**0.1**
2	**$1,926**	8189	**292**	27.8	**19.2**	**96.2**	**201**	**1.5**	**7.7**	**7.8**	**0.2**
0	$1,882	7962	**294**	26.8	**19.3**	**96.2**	**201**	**1.3**	**7.7**	**7.6**	-0.1
Average	$1,979	8,437	294	28.5	19.3	96.2	204	1.1	7.7	7.8	0.1
LSD 5%	87.5	372.4	ns(4.0)	1.1	ns(.25)	ns(.22)	ns(12.9)	ns(1.4)	ns(.1)	ns(.3)	0.3
CV %	2.4	2.4	0.8	2.2	0.7	0.1	3.5	70.7	0.7	2.4	160

Bold: Results are not statistically different from top-ranking treatment.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Three lime trials were established in the fall of 2011. Sugar factory spent lime was applied to the plot area and soil samples were taken from each plot to characterize the soil, including the soil pH.

Sugarbeets were planted in the spring of 2012. Sugarbeet yield in tons per acre and recoverable white sugar per acre increased significantly with higher rates of lime, as did the income per acre. Sugarbeet stand and quality were not affected by the treatments. The soil pH increased marginally in the lime treatments. There was not enough root rot to determine if the lime applications helped to prevent disease.



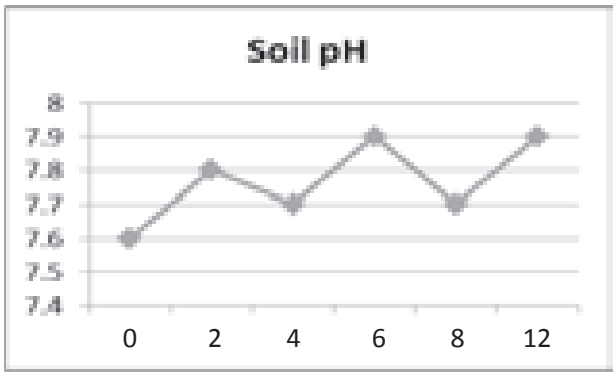
Lime Trials - Evaluate the Influence of Lime Applications on Soil pH & Nutrient Levels in Sugarbeet Petioles Average of 3 Trials Conducted in 2012 (page 2 of 5)

Tons Lime/ Acre	Net $/A	Change in soil pH	Macro Nutrients					Micro Nutrients				
			Percent					ppm				
			S	P	K	Mg	Ca	B	Zn	Mn	Fe	Cu
12	**$2,053**	**0.3**	**0.1**	**0.3**	**3.9**	**0.2**	**0.7**	**29**	**11**	10	**59**	**4**
8	**$2,053**	**0.1**	**0.1**	**0.2**	**4.1**	**0.2**	**0.8**	**30**	**12**	11	**58**	**4**
6	**$1,987**	**0.2**	**0.1**	**0.2**	**3.8**	**0.2**	**0.8**	**30**	**12**	11	**75**	**4**
4	**$1,971**	**0.1**	**0.1**	**0.2**	**3.9**	**0.2**	**0.8**	**29**	**11**	11	**57**	**4**
2	**$1,926**	**0.2**	**0.1**	**0.3**	**3.9**	**0.3**	**0.8**	**29**	**11**	**12**	**71**	**4**
0	$1,882	-0.1	**0.1**	**0.3**	**3.7**	**0.2**	**0.7**	**29**	**12**	**13**	**69**	**4**
Average	$1,979	0.1	0.1	0.2	3.3	0.3	0.9	29	10	14	112	4
LSD 5%	87.5	0.29	ns(.0)	ns(.0)	ns(.4)	ns(.07)	ns(.2)	ns(1.9)	ns(1.1)	2.1	ns(45)	ns(.7)
CV %	2.4	160	8.7	15.8	10.0	18.7	22.5	5.6	9.1	12.3	33.6	14.3

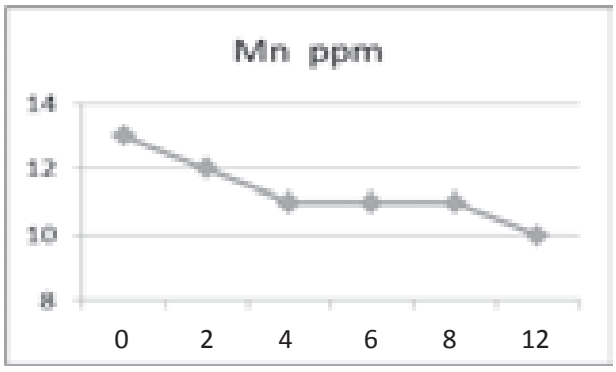
Bold: Results are not statistically different from top-ranking treatment.

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Lime applied in the fall of 2011 at rates of 0 to 12 tons/A, increased the soil pH and decreased the level of Mn in sugarbeet petioles. The changes for both were rate related. The level of other nutrients did not change significantly, even though the level of Manganese decreased with lime applications, the sugarbeet yields increased with higher lime rates. Lime was applied in the fall of 2011 and sugarbeets were planted in the spring of 2012.



Lime Rate in Tons/Acre



Lime Rate in Tons/Acre

PIONEER · BIG CHIEF
MICHIGAN SUGAR

Lime Trial
Helmreich, Bay City, MI - 201
(page 3 of 5)

Trial Quality: Good
Planted: April 4
Harvested: Oct 12
Plot Size: 6 rows X 50 ft, 6 reps
Row Spacing: 22 inch

Previous Crop: Soybeans
Seeding Rate: 4.1 inches
Variety: HM-28RR
Seasonal Rainfall: 21.5 inches

Rhizoc Control: Quadris
6-8 lf, Good Control
Cercospora Control: 3 Applic
Good Control
Other Pests: None

Treatment	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets B/100' Aug 7	Stand B/100' Aug 7
8 Tons/Acre	**$1,862**	**7973**	**308**	**25.9**	**20.3**	**95.8**	**1.9**	**194**
6 Tons/Acre	**$1,817**	**7766**	**308**	**25.2**	**20.2**	**96.1**	**1.5**	**191**
12 Tons/Acre	**$1,788**	**7695**	**309**	**24.9**	**20.3**	**96.1**	**2.4**	177
4 Tons/Acre	**$1,782**	**7600**	**308**	**24.7**	**20.3**	**95.9**	**1.9**	**189**
2 Tons/Acre	$1,694	7205	**307**	23.5	**20.3**	**95.8**	4.4	**198**
0 Tons/Acre	$1,659	7017	**305**	23.0	**20.1**	**96.0**	**2.4**	**193**
Average	$1,767	7543	308	24.5	20.2	96.0	2.4	190
LSD 5%	143.2	605.8	ns(4.7)	2.1	ns(0.3)	ns(.5)	2.8	17.9
CV %	6.7	6.7	1.3	7.0	1.3	0.4	98.7	7.9

Lime Trial - pH & Nutrients

Treatment	Net $/A	pH			Tissue Test					
		Nov 23 2011	Jun 11 2012	Change	Percent				ppm	
					P	K	Mg	Ca	Mn	B
8 Tons/Acre	**$1,862**	**7.9**	**7.9**	0.03	**0.20**	**3.4**	**0.33**	0.85	12.5	**29.3**
6 Tons/Acre	**$1,817**	**7.9**	**7.9**	0.07	**0.19**	**3.3**	**0.29**	0.81	13.3	**28.8**
12 Tons/Acre	**$1,788**	**7.9**	**7.9**	0.05	0.17	**3.3**	**0.34**	**0.97**	13.3	**29.7**
4 Tons/Acre	**$1,782**	**7.9**	**7.9**	0.02	**0.19**	**3.3**	**0.32**	**0.99**	**14.2**	**29.3**
2 Tons/Acre	$1,694	**7.9**	**7.8**	**-0.07**	0.16	**3.5**	**0.35**	**1.11**	**15.7**	**28.5**
0 Tons/Acre	$1,659	**7.9**	7.8	**-0.17**	0.16	**3.2**	**0.32**	**0.88**	**15.3**	**28.3**
Average	$1,767	7.9	7.9	-0.01	0.18	3.3	0.33	0.93	14.1	29.0
LSD 5%	143.2	ns(.1)	0.1	0.13	0.03	ns(.4)	ns(.07)	0.25	2.1	ns(1.9)
CV %	6.7	0.5	1.1	0.00	15.8	10.0	18.7	22.5	12.3	5.6

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Spent factory lime was applied on November 23, 2011 at rates of 0 to 12 tons/acre. The sugarbeet trial was planted in 2012 and data collected, including soil samples and tissue tests. The higher lime rates had slightly higher pH levels and lower Manganese levels. However, the higher lime rates also had the highest yields. In the yield trial T/A, RWSA and $/A were all higher at the 4, 6, 8 and 12 ton rates of lime. The lower Mn tissue level did not hurt production. There was not enough Aphanomyces or Rhizoctonia disease present to evaluate the lime in reducing these diseases.

PIONEER · BIG CHIEF
MICHIGAN SUGAR

Lime Trial
Hrabal, Breckenridge, MI - 2012
(page 4 of 5)

Trial Quality: Good
Planted: April 4
Harvested: Nov 2
Plot Size: 6 rows X 50 ft, 6 reps
Row Spacing: 22 inch

Previous Crop: Corn
Seeding rate: 4.1 inches
Variety: HM-28RR
Seasonal Rainfall: 23.3 inches

Rhizoc Control: Quadris 6-8 lf, Good Control
Cercospora Control: 4 Applic Good Control
Other Pests: None

Treatment	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Stand B/100' Aug 2
12 Tons/Acre	**$2,961**	**12662**	**305**	**41.6**	**19.9**	**96.5**	**219**
8 Tons/Acre	**$2,852**	**12161**	**303**	**40.1**	**19.8**	**96.5**	**222**
6 Tons/Acre	**$2,791**	**11887**	**304**	**39.2**	**19.8**	**96.6**	214
4 Tons/Acre	**$2,777**	11806	**302**	**39.0**	**19.7**	**96.6**	**219**
2 Tons/Acre	$2,727	11577	**304**	38.1	**19.7**	**96.7**	**212**
0 Tons/Acre	$2,660	11255	**303**	37.1	**19.8**	**96.4**	211
Average	$2,795	11891	303	39.2	19.8	96.6	216
LSD 5%	194.0	820.9	ns(6.4)	2.7	ns(.4)	ns(.4)	13.9
CV %	5.8	5.8	1.8	5.8	1.6	0.3	5.4

Lime Trial - pH & Nutrients

Treatment	Net $/A	pH			Tissue Test					
		Nov 21 2011	Jun 11 2012	Change	Percent				ppm	
					P	K	Mg	Ca	Mn	B
12 Tons/Acre	**$2,961**	**7.8**	**8.0**	**0.20**	**0.33**	**4.0**	**0.16**	**0.50**	6.7	**28.3**
8 Tons/Acre	**$2,852**	**7.8**	**8.0**	**0.20**	**0.33**	**3.9**	**0.17**	**0.56**	7.3	**28.7**
6 Tons/Acre	**$2,791**	**7.8**	**7.9**	**0.08**	**0.34**	**4.0**	**0.15**	**0.51**	**8.0**	**28.8**
4 Tons/Acre	**$2,777**	**7.7**	**7.9**	**0.15**	**0.33**	**3.9**	**0.18**	**0.57**	**8.3**	**28.2**
2 Tons/Acre	$2,727	**7.8**	**8.0**	**0.20**	**0.32**	**3.9**	**0.18**	**0.62**	**9.2**	**29.0**
0 Tons/Acre	$2,660	**7.8**	**7.9**	**0.12**	**0.34**	**3.8**	**0.16**	**0.54**	**9.7**	**28.5**
Average	$2,795	7.8	7.9	0.16	0.33	3.9	0.16	0.55	8.2	28.6
LSD 5%	194.0	ns(.1)	ns(.2)	ns(.23)	ns(.03)	ns(.3)	ns(.04)	ns(.15)	1.9	ns(1.8)
CV %	5.8	1.5	1.7	120.7	8.7	6.2	18.9	22.7	19.7	5.4

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Spent factory lime was applied on November 21, 2011 at rates of 0 to 12 tons/acre. The sugarbeet trial was planted in 2012 and data was collected, including soil samples and tissue tests. There were no significant differences in the pH levels. Most tissue test levels were statistically the same, but Manganese decreased at the two higher rates. In the yield trial T/A, RWSA and $/A were all statistically higher at the 4, 6, 8 and 12 ton rates of lime. The lower Mn tissue level did not hurt production. There was not enough Aphanomyces or Rhizoctonia disease present to evaluate the lime in reducing these diseases.

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MICHIGAN SUGAR

Lime Trial
Spero, Saginaw, MI - 2012 (page 5 of 5)

Trial Quality: Fair
Planted: April 12
Harvested: Oct 12
Plot Size: 6 rows X 50 ft, 6 reps
Row Spacing: 22 inch

Previous Crop: Soybeans
Seeding rate: 4.1 inches
Variety: HM-28RR
Seasonal Rainfall: 20.0 inches

Rhizoc Control: Quadris
6-8 lf, Good Control
Cercospora Control: 4 Applic
Good Control
Other Pests: None

Treatment	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Stand B/100' Aug 18
8 Tons/Acre	**$1,444**	**6205**	**268**	**23.3**	**17.8**	**95.9**	**208**
12 Tons/Acre	**$1,411**	**6104**	**272**	**22.4**	**18.0**	**96.1**	**213**
2 Ton/Acre	**$1,358**	**5785**	**267**	**21.7**	**17.7**	**96.0**	194
4 Tons/Acre	**$1,353**	**5782**	**270**	**21.5**	**17.9**	**95.9**	**209**
6 Tons/Acre	**$1,332**	**5712**	**275**	**20.8**	**18.2**	**96.1**	**210**
0 Tons/Acre	**$1,327**	**5613**	**276**	**20.4**	**18.2**	**96.1**	200
Average	$1,371	5867	271	21.7	18.0	96.0	206
LSD 5%	ns(220)	ns(887)	ns(9.0)	ns(3.4)	ns(.5)	ns(.4)	10.7
CV %	12.7	12.6	2.8	13.2	2.3	0.4	4.4

Lime Trial - pH & Nutrients

Treatment	Net $/A	pH			Tissue Test					
		Nov 16 2011	Jun 11 2012	Change	Percent				ppm	
					P	K	Mg	Ca	Mn	B
8 Tons/Acre	**$1,444**	**7.3**	7.2	-0.02	**0.24**	**4.9**	**0.17**	**0.87**	**12.3**	**31.8**
12 Tons/Acre	**$1,411**	**7.4**	**7.9**	**0.48**	**0.26**	4.3	**0.18**	0.67	**11.2**	30.3
2 Ton/Acre	**$1,358**	**7.4**	**7.7**	**0.35**	**0.27**	4.2	**0.17**	0.68	**10.0**	28.5
4 Tons/Acre	**$1,353**	**7.4**	7.4	0.00	**0.22**	**4.4**	**0.17**	**0.81**	9.7	29.7
6 Tons/Acre	**$1,332**	**7.5**	**7.8**	**0.33**	0.17	4.2	**0.20**	**1.09**	**11.3**	**32.7**
0 Tons/Acre	**$1,327**	**7.3**	7.1	-0.25	**0.26**	4.2	**0.18**	0.70	**13.0**	**31.2**
Average	$1,371	7.4	7.5	0.15	0.24	4.4	0.18	0.80	11.3	30.7
LSD 5%	ns(220)	ns(.4)	0.4	0.48	0.07	0.5	ns(.04)	0.31	3.0	2.0
CV %	12.7	4.2	4.1	268.0	23.4	9.3	18.0	32.9	22.2	5.6

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Spent factory lime was applied on November 16, 2011 at rates of 0 to 12 tons/acre. The sugarbeet trial was planted in 2012 and data was collected including soil samples and tissue tests. The pH levels increased at the higher lime rates. The tissue test levels varied some but lime does not appear to be the cause. However the Manganese level was the highest with no lime. In the yield trial T/A, RWSA and $/A were all statistically the same but the 0 rate of lime was the lowest. There was not enough Aphanomyces or Rhizoctonia disease present to evaluate the lime in reducing these diseases.

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MICHIGAN SUGAR

Gypsum Trials
3 Locations - 2012
(page 1 of 2)

Maust, Pigeon, MI

Trial Quality: Good
Planted: May 14
Harvested: Sept 19
Plot Size: 2 rows X 50 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Soil Info: Loam
3.6% OM, 5.9 pH
Previous Crop: Soybeans
Other Pests: None
Variety: C-RR827
Seasonal Rainfall: 20.2 inches

Rhizoc Control: Quadris,
T-band and 6-8 lf
Good Control
Cercospora Control:
4 Applications
Good Control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Emerg Jun 13
No Gypsum	**$1,354**	**5728**	**214**	**26.7**	**14.7**	**95.0**	**89.4**
Gypsum	**$1,330**	**5627**	**215**	**26.2**	**14.9**	**94.7**	**87.2**
Average	$1,342	5678	215	26.5	14.8	94.9	88.3
LSD 5%	ns(103.7)	ns(438.8)	ns(8.1)	ns(2.1)	ns(0.5)	ns(0.5)	ns(8.3)
CV %	5.2	5.2	2.6	5.3	2.2	0.3	6.3

Shaffner, Freeland, MI

Trial Quality: Good
Planted: April 25
Harvested: Oct 17
Plot Size: 2 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Soil Info: Silty Clay
2.9% OM, 7.7 pH
Previous Crop: Dry Beans
Other Pests: Low level of
Cyst Nematodes
Variety: HM-131RR
Seasonal Rainfall: 21.5 inches

Rhizoc Control: Quadris,
T-band and 6-8 lf
Good Control
Cercospora Control:
4 Applications
Good Control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Emerge Avg 5
No Gypsum	**$2,668**	**11289**	**269.9**	**41.9**	**18.8**	**93.6**	**41**
Gypsum	**$2,535**	**10724**	**272.1**	**39.4**	**18.9**	**93.6**	**36**
Average	$2,602	11006	271.0	40.6	18.8	93.6	39
LSD 5%	ns(255.6)	ns(1081.5)	ns(9.0)	ns(4.0)	ns(0.5)	ns(0.6)	ns(5.8)
CV %	6.6	6.6	2.2	6.7	1.6	0.5	10.1

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Gypsum applied over the row at planting was proposed to increase emergence. These trials did not show any benefit in percent emergence or $/Acre from the gypsum applications. Conditions for emergence were good at the Pigeon site, but emergence levels were low at Freeland.

Gypsum Trials
3 Locations - 2012
(page 2 of 2)

Kirkpatrick, McGregor, MI

Trial Quality: Poor
Planted: May 15
Harvested: Sept 24
Plot Size: 2 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.4 inches

Previous Crop: Corn
Other Pests: Moderate Cyst Nematode
Variety: C-RR074NT
Seasonal Rainfall: 19.0 inches

Rhizoc Control: Quadris, T-band and 6-8 lf
Cercospora Control: 3 Applic . Good Control

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Vigor 0-10 Jul 20	% Emerg Jun 8
Untreated	**$779**	**3296**	**216**	**15.2**	**14.9**	**94.7**	**7.0**	**88**
240 gr per 38 ft each row	**$703**	**2973**	**221**	**13.4**	**15.2**	**94.7**	**7.1**	**93**
960 gr per 38 ft each row	**$686**	**2900**	**218**	**13.3**	**15.1**	**94.6**	**7.1**	**88**
480 gr per 38 ft each row	**$640**	**2709**	**214**	**12.6**	**14.9**	**94.3**	**7.0**	**89**
Average	$702	2970	217	13.6	15.0	94.6	7.1	89
LSD 5%	ns(239.3)	ns(1012.4)	ns(14.1)	ns(4.2)	ns(0.8)	ns(0.8)	ns(0.8)	ns(7.7)
CV %	20.9	20.9	4.0	18.9	3.1	0.5	7.2	5.4

Bold: Results are not statistically different from top-ranking treatment.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Gypsum applied over the row at planting was proposed to increase emergence. This trial did not show any benefit in percent emergence or $/Acre. Emergence conditions were good. Cyst Nematodes were present and increased variability.

Fall Applied ESN Nitrogen
Spartan Acres (Knoerr), Freeland, MI - 2012

Trial Quality:	Good	**Seed Rate:**	60,000	**Rhizoc Control:**	Good Control: In Furrow & 6-8 Leaf
Variety:	B-19RR1N	**Soil Info:**	Loam		
Planted:	March 30	**Fertilizer:**	2x2: 21-32-0; Spring Broadcast 10 gal 28% w/ Aim Herb.	**Cerc Control:**	Excellent Control: 1. Inspire XT, 2. Headline + EBDC, 3. Eminent + EBDC, 4. Kocide 3000
Harv/Samp:	Nov 3/Oct 9				
Plot Size:	5 reps				
Row Spacing:	20 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Fall Applied ESN - 101# N	—	**10161**	**286**	**35.5**	**19.1**	**95.5**
Sidedressed 28% - 101# N	—	**10088**	**282**	**35.7**	**19.0**	**95.2**
LSD 5%	—	ns (638)	ns (10)	ns (2.8)	ns (0.5)	ns (0.5)
CV%	—	4	2	4.5	1.5	0.3

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: There has been an increase of planting sugarbeets into a stale seedbed with no spring tillage. In stale seedbed plantings, nitrogen applications are limited to sidedress or laying nitrogen on top of the ground. This trial was conducted to compare a fall (November) application of ESN nitrogen worked into the soil to a more standard spring application of sidedressed applied 28%. Fall application of nitrogen was approximately 95 pounds per acre of ESN with about 6 pounds of Nitrogen from AMS fertilizer for a total of 101 pounds N/acre. Sidedress application had 28% N mixed with Thiosol for a total of 101 pounds of applied Nitrogen per acre. No significant difference was measured in quality or yield. The total nitrogen applied was 151 lbs./acre for both treatments.

Boron Trial
Randy Sturm Farms, Pigeon, MI - 2012

Trial Quality:	Excellent	**Seed Rate:**	56,000	**Rhizoc Control:**	Good Control: 6-8 Leaf
Variety:	H-28RR	**Soil Info:**	Loam		
Planted:	March 23	**Fertilizer:**	PPI: 15 gal of 28% + 7 gal of Thiosul, Sidedress: 15 gal of 28%, Foliar Mn	**Cerc Control:**	Good Control: 1. Proline, 2. Gem + Kocide 3000
Harv/Samp:	Sept 24/Sept 21				
Plot Size:	5 rep				
Row Spacing:	28 inch	**Prev Crop:**	Dry Bean	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Boron Foliar: 2 Applications	—	**7313**	**252**	**29.1**	**17.0**	**95.4**
Boron Foliar: 1 Application	—	**7310**	**252**	**28.9**	**17.1**	**95.2**
Check	—	**7254**	**251**	**28.8**	**17.0**	**95.2**
Average	—	7292	252	28.9	17.0	95.3
LSD 5%	—	ns (190)	ns (5)	ns (1.1)	ns (0.3)	ns (0.2)
CV%	—	2	2	2.6	1.4	0.2

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: This trial was established to look at the effects of foliar applied boron on yield and quality. The first application was on 5/21/12 with 1 quart of TRACITE 10% Boron applied in a 7 inch band. The second application was on 6/4/12 at 1 quart per acre in a 10" band. Both applications were with 10 gallons of water per acre. Soil test boron level was 0.8 PPM. No significant differences were shown in any treatment.

Boron Trial
Brown Farms, Breckenridge, MI - 2012

Trial Quality:	Poor	**Seed Rate:**	54,000	**Rhizoc Control:**	Good Control: Quadris In Furrow & 6-8 Leaf
Variety:	HM-28RR	**Soil Info:**	Loam		
Planted:	April 7	**Fertilizer:**	2x2: 17gal of 22-12-0, PPI: 90# of N	**Cerc Control:**	Good Control: 1. Proline + EBDC, 2. Headline + EBDC, 3. Eminent + EBDC
Harv/Samp:	Sept 20/Sept 19				
Plot Size:	6 rep				
Row Spacing:	30 inch	**Prev Crop:**	Corn	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Boron in Starter	—	**5720**	**245**	**23.4**	**16.4**	**95.8**
Check	—	**5622**	**244**	**22.9**	**16.3**	**95.8**
Boron in Starter & Once Foliar	—	**5571**	**237**	**23.3**	**15.9**	**95.7**
Boron Foliar: 2 Applications	—	**5382**	**241**	**22.4**	**16.1**	**95.8**
Average	—	5574	242	23.0	16.2	95.8
LSD 5%	—	ns (864)	ns (8)	ns (3.4)	ns (0.5)	ns (0.3)
CV%	—	13	3	11.9	2.5	0.3

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trial was conducted to evaluate yield and quality response of 2 by 2 placements of boron fertilizer, two foliar applications, and a combination of foliar and 2 by 2. All applications used TRACITE 10% liquid boron. The field was harvested during early harvest. Soil test results indicated a 0.3 PPM boron level. Field and beet variability was high. Trial reliability would be considered low and no significant differences were shown in yield or quality.
Application Boron rates are:

- 1st foliar application- 1 quart/acre in 7" band
- 2nd foliar application- 1½ quarts in 10" band
- 2 by 2 placement—2 quarts/acre
- 2 by 2 placement and foliar—2 quarts followed by 1½ quarts/acre

Upplause & Advantage Foliar
Richmond Brothers & Randy Sturm - 2012

Richmond Brothers Farms LLC, Pigeon, MI

Trial Quality: Good
Variety: C-RR827
Planted: March 23
Harv/Samp: Nov 9/Oct 10
Plot Size: 4 reps
Row Spacing: 22 inch

Seed Rate: 69,000
Soil Info: Clay Loam
Fertilizer: 2010: 10,000 gal of manure, 2x2: 44-34-0 + micros & S, nitrate tested/applied N
Prev Crop: Corn

Rhizoc Control: Exc. Control: Quadris In Furrow & 6-8 Leaf
Cerc Control: Good Cont: 1. Proline + EBDC, 2. Gem + EBDC, 3. Proline + EBDC, 4. Eminent + EBDC
Other Pests: Mustang Max - In Fur.

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets/ 1200 Ft.
Check	—	**12493**	**280**	**44.6**	**19.5**	**93.5**	**5**
Upplause + Advantage	—	**12321**	**288**	**42.8**	**19.8**	**93.9**	**19**
LSD 5%	—	ns (1749)	ns (24)	ns (7.1)	ns (1.1)	ns (1.2)	ns (35)
CV%	—	6	4	7.2	2.4	0.6	130

Randy Sturm Farms, Pigeon, MI

Trial Quality: Good
Variety: H-28RR
Planted: March 23
Harv/Samp: Sept 24/Sept 21
Plot Size: 5 rep
Row Spacing: 28 inch

Seed Rate: 56,000
Soil Info: Loam
Fertilizer: PPI: 15 gal 28% + 7 gal Thiosul, Sidedress: 15 gal 28%, Foliar: Mn
Prev Crop: Drybeans

Rhizoc Control: Excellent Control: Quadris Foliar
Cerc Control: Good Control: 1. Proline, 2. Gem + Kocide
Other Pests: None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets/ 1200 Ft.
Upplause + Advantage	—	**7515**	**247**	**30.5**	**16.7**	**95.1**	**—**
Check	—	**7254**	**251**	**28.8**	**17.0**	**95.2**	**—**
LSD 5%	—	ns (649)	ns (8)	ns (3.3)	ns (0.5)	ns (0.4)	—
CV%	—	5	2	6.3	1.8	0.3	—

$/A: Not calculated due to no statistical differences found in yield.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trials were conducted to evaluate the effects of two combined foliar products on sugarbeet yield and quality. Product claims of enhanced photosynthesis, carbon fixation and slowing of transpiration which may increase yields. First application was at the 4-8 leaf stage at 1 quart per acre of each product mixed together in 10 gallons/acre of water. Second application was at the 10-12 leaf stage at 1.5 quarts per acre of each product. No significant differences measured. No visual difference seen during season.

Preliminary Final Report - Developing Nitrogen Decision-Making Tools to Optimize Recoverable White Sugar Per Ton in Sugarbeet Production

Laura L. Van Eerd, Jessica Turnbull, and Mike Zink
University of Guelph, Ontario 2010-2012, Ridgetown Campus

Trial Quality: Good

Weather 2010: Early planting and a 'typical' season
2011: Late planting and wet season
2012: Early planting and early harvest

Summary:
Managing nitrogen fertilizer is critical to optimizing RWST. It would be advantageous to have tools available to predict N fertilizer requirements and RWST yield potential. Research trials at 7 sites and survey sites at 40 grower fields were established in 2010 and 2011 to determine if SPAD® chlorophyll meter can be developed to predict 1) N fertilizer need at the time of sidedress application and 2) RWST yield potential at the time of sidedress N application and at harvest. In 2010, there were significant positive correlations between SPAD® readings taken at either the time of sidedress or at harvest and sugarbeet yield, % sugar and RWST, suggesting that the tool would be useful for growers. In 2011 and in 2012, the SPAD® readings were significantly correlated to sugarbeet yield, % sugar and RWST at the time of sidedress but not at harvest. The lack of relationship in 2011 at harvest was likely due to the late, spring and wet growing season. Further analysis of survey-grower fields and of SPAD® readings taken at research trials is needed.

Objective:
To field test the SPAD chlorophyll meter as a tool to predict 1) the need for N fertilizer or 2) RWST yield-potential.

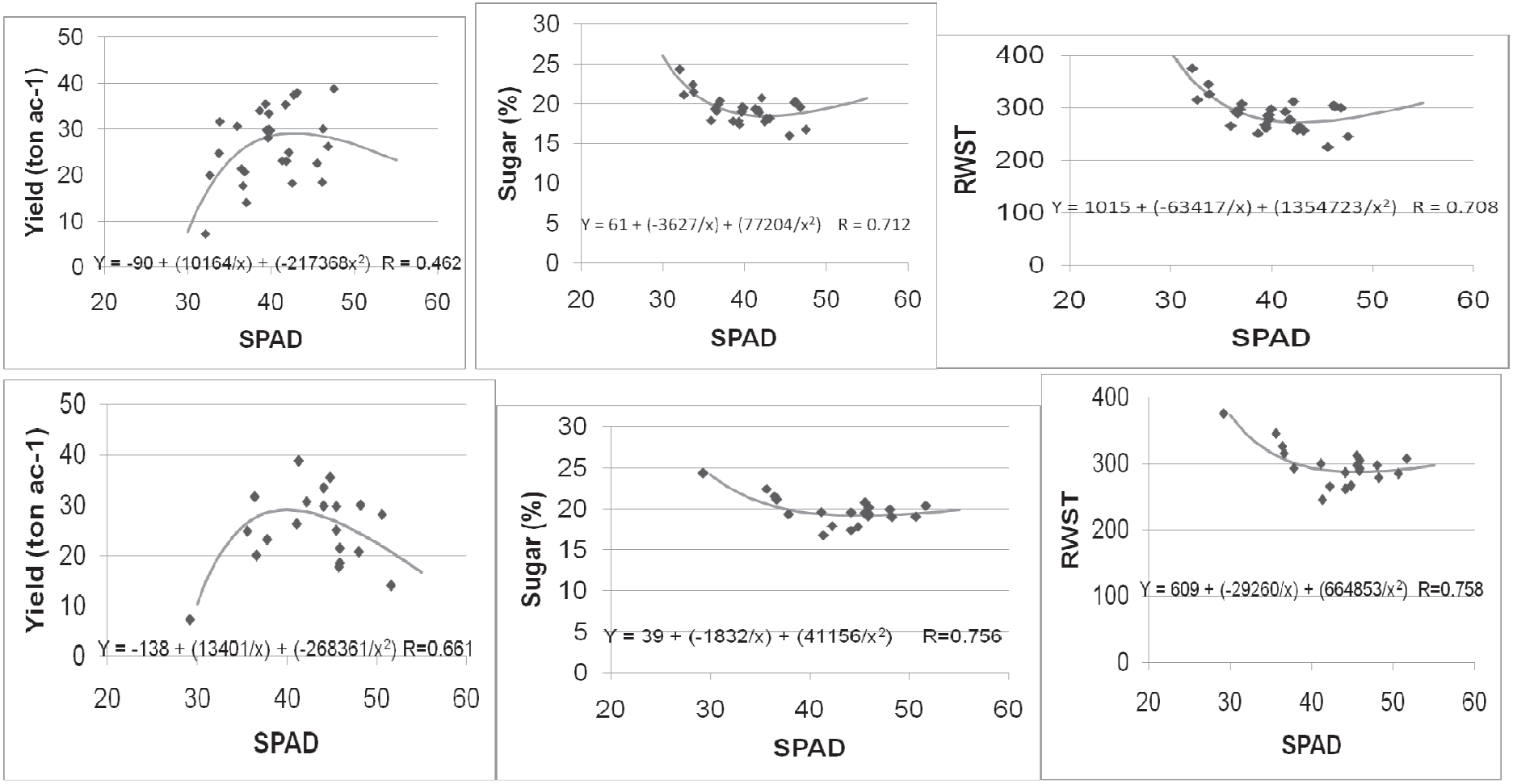
Methods:
Research trials were established in 6 farmer fields. Each site had 4 replications and consisted of 3 treatments, 1) a zero N control, and 2) typical grower practices –specific for each grower and 3) starter N only. SPAD® readings were taken at the time of sidedress N application (late May – early June) and at harvest. Root yield, % sugar and RWST were taken at harvest.

Results:
In 2010, results show significant correlations between SPAD® readings and sugarbeet yield, sugar content, and RWST when sampled at sidedress and at harvest (Figure 1) in the zero N treatment. This indicates that the SPAD® meter may be useful as a prediction tool. In 2011 and 2012, the SPAD® was more useful at sidedress than at harvest at predicting yield, % sugar and RWST in the zero N treatment (Figure 2). Analysis is underway on data collected from 40 survey-grower fields. Each field was randomly sampled in 6 locations/areas and had 2 to 3 sampling dates for SPAD® readings, soil and tissue samples. When soil and tissue nitrogen analysis are completed we can fully evaluate how applicable the SPAD® meter may be for sugarbeet growers.

Funding:
By Michigan Sugar Company, Ontario Sugarbeet Growers Association, Agriculture and Agri-Food Canada through the Agricultural Adaptation Council through the Farm Innovation Program, and Ontario Ministry of Agriculture, Food and Rural Affairs.

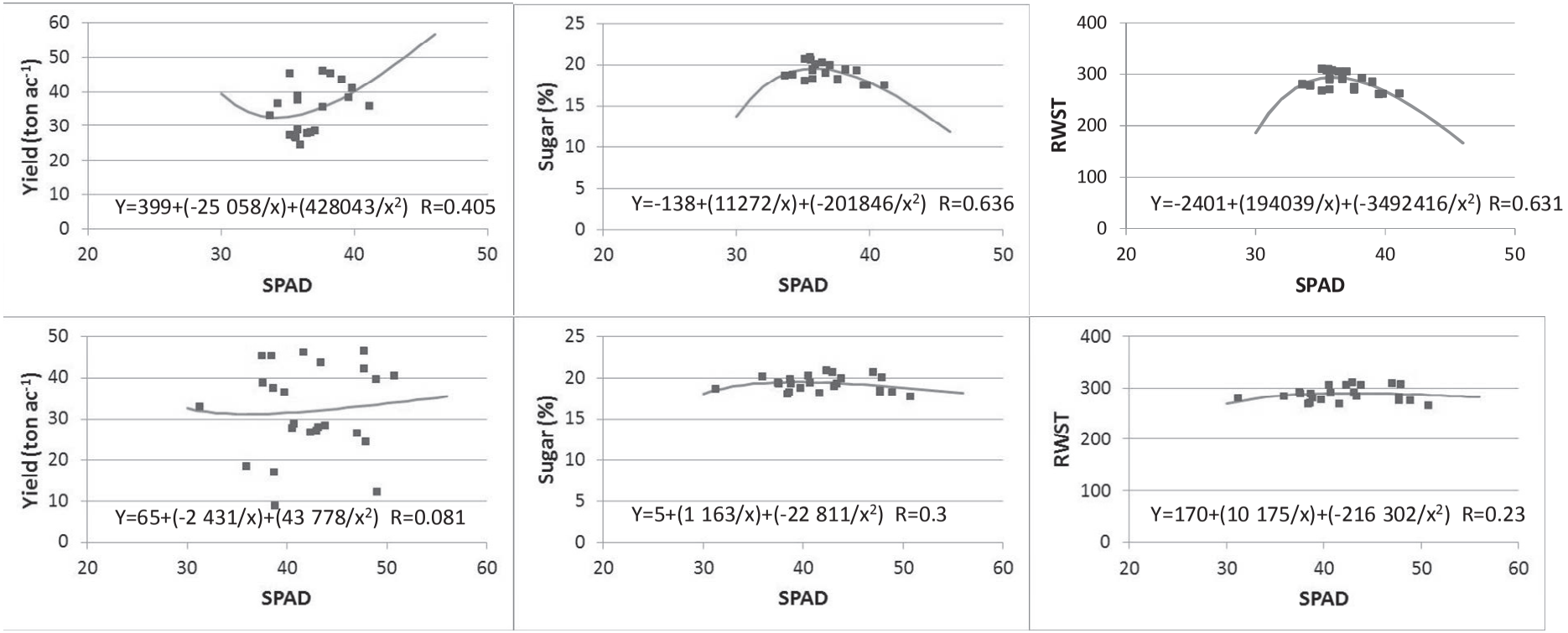
Preliminary Final Report - Developing Nitrogen Decision-Making Tools to Optimize Recoverable White Sugar Per Ton in Sugarbeet Production (continued)

Figure 1. In 2010, correlation between SPAD® meter values taken at sidedress (top) or at harvest (bottom) and sugarbeet root yield, percent sugar and RWST. Data from at least 5 research trials with 4 reps in the zero N treatment. R values ≥0.462 were significant at p=0.05.



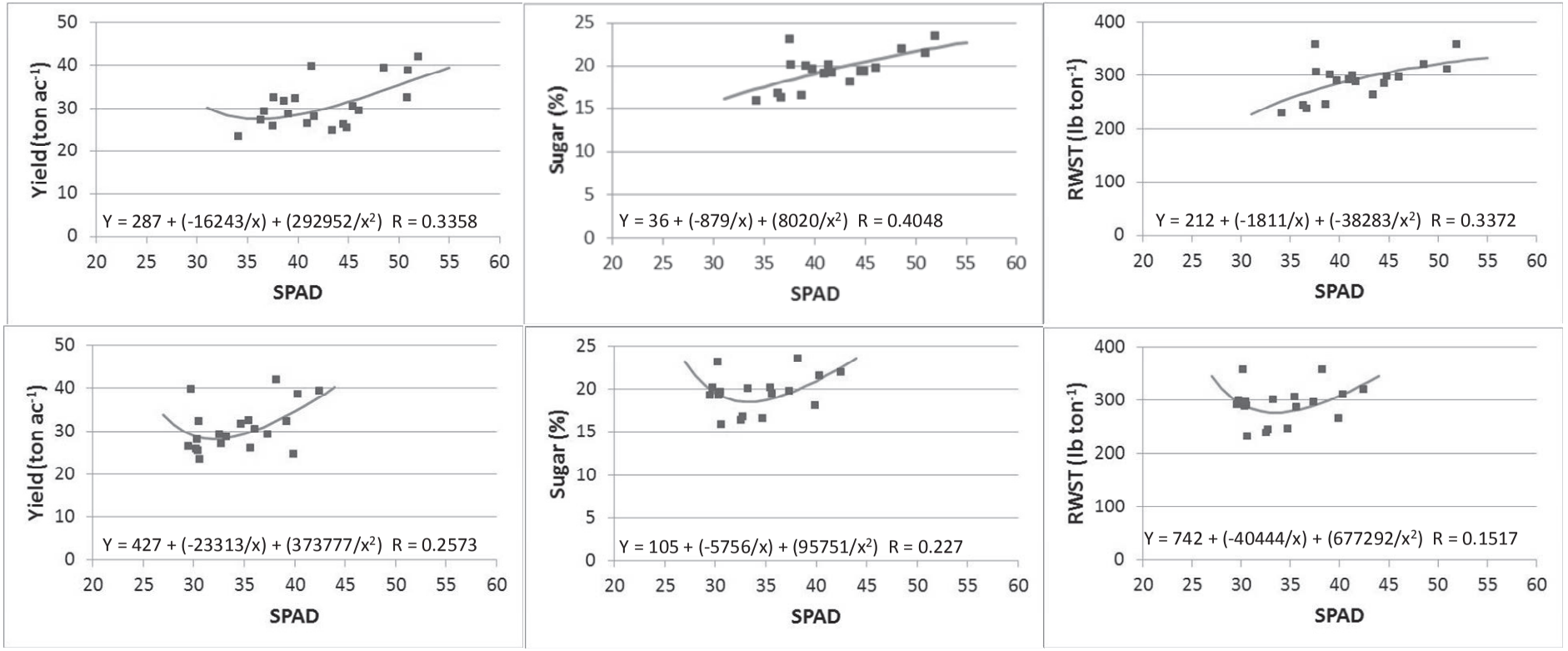
Preliminary Final Report - Developing Nitrogen Decision-Making Tools to Optimize Recoverable White Sugar Per Ton in Sugarbeet Production (continued)

Figure 2. In 2011, correlation between SPAD® meter values taken at sidedress (top) or at harvest (bottom) and sugarbeet root yield, percent sugar and RWST. Data from at least 5 research trials with 4 reps in the zero N treatment. R values ≥0.405 were significant at p=0.05.



Preliminary Final Report - Developing Nitrogen Decision-Making Tools to Optimize Recoverable White Sugar Per Ton in Sugarbeet Production (continued)

Figure 3. In 2012, correlation between SPAD® meter values taken at sidedress (top) or at harvest (bottom) and sugarbeet root yield, percent sugar and RWST. Data from 5 research trials with 4 reps in the zero N treatment. R values ≥0.3358 were significant at p=0.05.



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Foliar Slow-Release Nitrogen in Sugarbeet

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 5, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 2.9 OM; 7.8 pH; 40 ppm P; 183 ppm K
Variety: Hilleshog 9042 Roundup Ready

Tillage: Conventional with light S-tine at sidedress
N Rates: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

N Trt. (Total lb. N/A)	Sidedress (2-4 lf)	Foliar N (lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
80[a]	40	0	8758	290	30.2	19.8	94.5	167	9.9
120	80	0	9165	282	32.5	19.3	94.3	183	11.0
80	30	10[c]	8554	288	29.7	19.6	94.5	193	11.8
80	20	20[d]	8850	295	30.0	19.9	94.7	164	9.6
120	70	10[c]	8992	281	32.0	19.5	93.6	228	14.0
120	60	20[d]	9472	296	32.0	20.1	94.6	163	9.8
$LSD_{(0.10)}$[b]	**----**	**----**	**----**	**10**	**3.3**	**0.5**	**0.5**	**56**	**3.5**

[a] All plots received 40 lbs. N/A as starter.
[b] LSD, least significant difference between means within a column at (α = 0.10).
[c] 3 applications at 1 gallon per acre on May 15, May 31, and June 13 for a total of 10 lb. N.
[d] 3 applications at 2 gallon per acre on May 15, May 31, and June 13 for a total of 20 lb. N.

Summary: Trial was conducted 1) to investigate the effects of N-Demand (30-0-0; 60% slow-release N, 40% urea) as a foliar slow-release in-season nitrogen application and 2) to determine whether any benefit existed to reducing sidedress N applications by 10-20% only to supplement this N through foliar mid-summer N applications. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/ A as starter placed 2x2 on April 5. Foliar slow-release N had little impact on yield or sugar quality. Past research has indicated potential benefits to foliar N applications only when soil moisture conditions are favorable. The dry growing conditions of 2012 likely limited the probability for positive responses to any mid-summer foliar N applications. Data demonstrate no benefit to reducing sidedress N applications and supplementing with foliar N.

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Does Nitrogen Source Impact Sugar Yield & Quality?

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 5, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 2.9 OM; 7.8 pH; 40 ppm P; 183 ppm K
Variety: Hilleshog 9042 Roundup Ready

Tillage: Conventional with light S-tine at sidedress
N Sources: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

N Trt. (Total lb. N/A)	Sidedress (2-4 lf) Lb. N/A	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
120[a]	80 - Urea	9165	282	32.5	19.3	94.3	183	11.0
120	80 - AS	9607	292	32.9	19.9	94.3	207	12.4
120	80 - ASN	8634	284	30.4	19.4	94.2	202	12.1
120	80 – ESN **(PRE-PLANT)**	9120	285	32.0	19.5	94.1	324	19.2
$LSD_{(0.10)}$[b]	**----**	**----**	**8**	**NS**	**0.4**	**NS**	**NS**	**NS**

[a] All plots received 40 lbs. N/A as 28% applied 2x2 starter.
[b] LSD, least significant difference between means within a column at (α = 0.10).

Summary: Trial was conducted to determine the effects of urea, ammonium sulfate (AS), ammonium sulfate-nitrate (ASN), and polymer-coated urea (ESN, Environmentally Smart Nitrogen) as N sources for sugarbeet production. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/A as starter placed 2x2 on April 5. Sidedress N applications of urea, AS, or ASN were completed on May 14 and were followed by a light cultivation to avoid N volatilization. Due to the slow-release N of ESN, this product was applied pre-plant on April 5. The AS and ASN fertilizer applications provided 91 and 43 lbs sulfate-S, respectively. Nitrogen source had little effect on total yield and minor effects on % sugar and RWST. Although statistically not significant, the slow-release ESN product did result in high levels of soluble N impurities. This may be due in part to the extremely dry summer 2012 soil moisture conditions preventing N release until later in the season when rainfall occurred. Past research has shown N source (ammonium or nitrate) to affect the sugarbeet amino-N content. Data from the current study show little influence of N source on soluble N impurities but rather a larger influence from N release rate.

Sugarbeet Nitrogen Response Following Soybean

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 5, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 3.0 OM; 8.2 pH; 29 ppm P; 223 ppm K
Variety: Hilleshog 9042 Roundup Ready

Tillage: Conventional with light S-tine at sidedress
N Rates: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	7239	302	24.0	20.4	94.7	132	7.5
40	8084	303	26.7	20.3	95.1	146	8.4
80	8171	294	27.8	19.9	94.6	182	10.4
120	8955	301	29.8	20.4	94.6	190	10.9
160	8990	292	30.8	20.0	94.0	210	12.1
$LSD_{(0.10)}$[a]	**518**	**7**	**1.5**	**NS**	**0.5**	**49**	**2.8**

[a] LSD, least significant difference between means within a column at (α = 0.10).

N Trt. (Total lb. N/A)	Gross Grower Payment ($/A)	Net Economic Return Minus N Costs ($/A)[b]	Net Economic Return Minus N Costs and Trucking ($/A)[c]
0 – Check	1684	1684	1600
40	1880	1854	1761
80	1901	1849	1751
120	2083	2005	1901
160	2091	1987	1879
$LSD_{(0.10)}$[a]	**121**	**121**	**116**

[a] LSD, least significant difference between means within a column at (α = 0.10).
[b, c] Gross grower payment and net economic returns based upon a $65/ton payment, an average RWST equal to the company average, an N price of $0.65/lb., and trucking costs of $3.50/T.

Summary: Trial was conducted to more accurately determine sugarbeet nitrogen fertilizer needs and nitrogen response following soybean. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/ A as starter placed 2x2 on April 5 (check plots did not receive any N). The 40 lb. N/A treatment received no supplemental N beyond the starter application. Sidedress N (urea) applications were completed on May 14 and were followed by a light cultivation to avoid N volatilization. With the exception of % sugar, all yield, sugar quality, and economic parameters were significantly affected by total N application rate. Though providing slightly less tonnage than 160 lb N, the 120 lb. N treatment provided greater RWST. When factoring in grower payment in addition to nitrogen and trucking costs, 120 lb N/A provided the greatest return on investment. If fertilizing at N rates less than 120 lbs. N/A and following soybean, data show no benefit above 40 lbs. N placed as a 2x2 starter application. Soluble N compounds increased with increasing N rate but were not excessive even at the high rate of N. Net economic return is based on a $65/ton payment, an average RWST equal to the company average, an N price of $0.65/lb., and trucking costs of $3.50/T.

Sugarbeet Nitrogen Response Following Wheat

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 5, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 2.9 OM; 7.8 pH; 40 ppm P; 183 ppm K
Variety: Hilleshog 9042 Roundup Ready

Tillage: Conventional with light S-tine at sidedress
N Rates: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
0 – Check	7683	293	26.2	19.8	94.7	124	7.3
40	8595	297	28.9	20.1	94.8	138	8.1
80	8786	290	30.2	19.8	94.4	167	9.8
120	9197	282	32.5	19.3	94.3	183	11.0
160	10197	287	35.6	19.6	94.2	224	13.5
200	9645	277	34.8	19.3	93.6	213	12.8
240	9605	274	35.0	19.1	93.6	249	14.9
$LSD_{(0.10)}$[a]	**892**	**8**	**2.8**	**0.4**	**0.5**	**42**	**2.7**

[a] LSD, least significant difference between means within a column at (α = 0.10).

N Trt. (Total lb. N/A)	Gross Grower Payment ($/A)	Net Economic Return **Minus N** Costs ($/A)[b]	Net Economic Return Minus **N Costs and** Trucking ($/A)[c]
0 – Check	1787	1787	1696
40	1999	1973	1872
80	2044	1992	1886
120	2139	2061	1948
160	2372	2268	2143
200	2244	2114	1992
240	2234	2078	1956
$LSD_{(0.10)}$[a]	**207**	**207**	**198**

[a] LSD, least significant difference between means within a column at (*a* = 0.10).
[b, c] Gross grower payment and net economic returns based upon a $65/ton payment, an average RWST equal to the company average, an N price of $0.65/lb., and trucking costs of $3.50/T.

Summary: Trial was conducted to more accurately determine sugarbeet nitrogen fertilizer needs and nitrogen response following wheat. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/A as starter placed 2x2 on April 5 (check plots did not receive any N). The 40 lb. N/A treatment received no supplemental N beyond the starter application. Sidedress N (urea) applications were completed on May 14 and were followed by a light cultivation to avoid N volatilization. Total nitrogen rate had a significant effect on all yield, sugar quality, and economic parameters. The 160 lb. N treatment yielded greater tonnage and RWSA as compared to all other N treatments. When factoring in grower payment in addition to nitrogen and trucking costs, 160 lb N/A provided the greatest return on investment. Soluble N compounds increased up to the 160 lb N treatment but the 200 lb N rate appeared to promote enough top- and root-growth to dilute both NH2 and amino-N concentrations. Soluble N compounds did not approach excessively high levels until the N rate of 240 lbs. N/A. Data following wheat indicate that 160 lbs. total N may be required to maximize sugarbeet yield and economic return. Net economic return is based on a $65/ton payment, an average RWST equal to the company average, an N price of $0.65/lb., and trucking costs of $3.50/T.

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Polymer-Coated Urea as N Source for Sugarbeet Production

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 5, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 2.9 OM; 7.8 pH; 40 ppm P; 183 ppm K
Variety: Hilleshog 9042 Roundup Ready

Tillage: Conventional with light S-tine at sidedress
N Source and Rate: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

N Trt. (Total lb. N/A)	Sidedress (2-4 lf) Lb. N/A	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
40[a]	0	8595	297	28.9	20.0	94.8	138	8.1
80	40 - Urea	8786	290	30.2	19.8	94.5	167	9.8
120	80 - Urea	9197	282	32.5	19.3	94.3	183	11.0
160	120 - Urea	10197	287	35.5	19.6	94.2	224	13.5
200	160 -Urea	9645	277	34.8	19.3	93.6	213	12.8
120	80 – ESN (PRE-PLANT)	9120	285	32.0	19.5	94.1	324	19.2
200	160 – ESN (PRE-PLANT)	9l 19	269	33.9	18.8	93.3	258	15.4
$LSD_{(0.10)}$[b]	**----**	**----**	**9**	**3.2**	**0.4**	**0.4**	**110**	**6.5**

[a] All plots received 40 lbs. N/A as 28% applied 2x2 starter.
[b] LSD, least significant difference between means within a column at (α = 0.10).

Summary: Trial was conducted to determine the effects of polymer-coated urea (ESN, Environmentally Smart Nitrogen) on sugarbeet production and quality. ESN is one example of a polymer-coated urea product that functions as a slow-release N fertilizer by metering the N release through the polymer coating. All treatments received 40 lbs. N/A as 28%, 20 lbs. P_2O_5/A, 50 lbs. K_2O/A. and 2 lbs. Mn/ A as starter placed 2x2 on April 5. Sidedress N applications of urea were completed on May 14 and were followed by a light cultivation to avoid N volatilization. In order to initiate the N release process early, polymer-coated urea was applied as a pre-plant application on April 5. At similar N rates, polymer-coated urea and urea obtained similar tonnage, RWSA, RWST, % sugar, and % CJP. Polymer-coated urea did increase soluble N impurities within the beet. The extremely dry weather conditions of 2012 may have delayed N release until later in the growing season as evidenced by green tops at harvest (personal observation) and elevated levels of soluble N. Slow- release nitrogen products such as polymer coated urea offer the benefit of reduced number of trips/applications through the field but will need to be considered along with trends in overall precipitation.

Pop-Up Fertilizer Applications in Sugarbeets

Kurt Steinke & Andrew Chomas, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 12, 2012 (Harvest 10/5/12)
Soil Type: Clay loam; 2.9 OM; 7.8 pH; 40 ppm P; 183 ppm K
Variety: Crystal RR059

Tillage: Conventional
Rates: See below
Population: 4 ¼ in. spacing
Replicated: 4 replications

Trt.	Rate	Placement	Plants/ 100 ft	RWSA	RWST	Tons/A	% Sugar	% CJP	NH2	Amino-N
Check[a]	----	----	140	9896	286	34.6	19.4	94.6	219	13.6
10-34-0	3 gpa	In furrow	111	9167	291	31.5	19.8	94.3	231	13.2
10-34-0	5 gpa	In furrow	106	9870	292	33.8	19.8	94.6	226	13.0
10-34-0	7 gpa	In furrow	86	7896	279	28.3	19.2	93.9	264	16.3
10-34-0 with MMREE	3 gpa and 2 qt/A	In furrow	126	9109	282	32.3	19.3	94.3	242	14.2
6/24/06	2 gpa	In furrow	117	9682	297	32.6	20.0	94.7	192	11.1
6-24-6 with MMREE	2 gpa and 2 qt/A	In furrow	114	9009	286	31.5	19.5	94.3	229	13.3
MMREE	2 qt/A	In furrow	120	9291	285	32.6	19.3	94.7	250	14.8
Gavilon 30 (8-14-4)	2 gpa	In furrow	131	10119	295	34.3	19.9	94.9	191	10.9
Pro-Germinator Micro-500 28% UAN	2.5 gpa 2 qt/A 40 lb.N/A	In furrow In furrow 2x2	114	9501	277	34.3	19.0	94.2	272	16.4
Pro-Germinator Micro-500 Pro-Germinator Sure-K 28% UAN	2.5 gpa 2 qt/A 1.5 gpa 7.5 gpa 40 lb.N/A	In furrow In furrow 2x2 2x2 2x2	131	10226	308	33.2	20.5	95.3	197	10.7
Pro-Germinator Sure-K Mico-500 28% UAN	4 gpa 7.5 gpa 2 qt/A 40 lb.N/A	2x2 2x2 2x2 2x2	154	10441	308	33.9	20.6	95.2	211	11.8
$LSD_{(0.10)}$[b]	**----**	**----**	**7**	**----**	**15**	**2.5**	**0.7**	**0.6**	**59**	**3.6**

[a] All plots received 40 lbs. P_2O_5/A, 100 lbs. K_2O/A. and 2 lbs. Mn/ A applied broadcast preplant incorporated on April 12. Nitrogen applications in the form of urea were applied broadcast, pre-plant incorporated at a rate of 140 lbs. N/A. For treatments receiving 40 lbs N/A specifically as a 2x2 application, this total was subtracted from the pre-plant N rate resulting in 100 lbs N/A applied PPI.

[b] LSD, least significant difference between means within a column at ($\alpha = 0.10$).

Pop-Up Fertilizer Applications in Sugarbeets
Kurt Steinke & Andrew Chomas, Michigan State University
(continued)

Summary: Trial was conducted to investigate the effects of pop-up/in-furrow fertilizer application for sugarbeet production. All treatments received 40 lbs. P_2O5/A, 100 lbs. K_2O/A. and 2 lbs. Mn/ A applied broadcast pre-plant incorporated (PPI) on April 12. Nitrogen applications in the form of urea were applied broadcast, pre-plant incorporated at a rate of 140 lbs. N/A. For treatments receiving 40 lbs N/A specifically as a 2x2 application, this total was subtracted from the pre-plant N rate resulting in 100 lbs N/A applied PPI. The control treatment received no pop-up or 2x2 fertilizer application but did receive P, K, and Mn.

The high N and K rates applied PPI in this study likely resulted in some degree of salting-out due to the extremely dry weather conditions encountered immediately after planting and throughout 2012. Pop-up fertilizer applications are intended to assist early-season plant emergence and growth when planting into cold and or wet spring soils, conditions frequently encountered with sugarbeet production. Data from this study demonstrate the sensitivity of the beet seed to fertilizer salts placed in close proximity as all treatments receiving pop-up applications displayed significantly reduced harvest stand counts, thus indirectly influencing yield, RWST, and RWSA. Data from the final treatment in the study, which only received 2x2 fertilizer applications, show greater plant population numbers due to not having pop-up fertilizer and only receiving 100 lbs N/A as PPI. Yield and sugar quality data from check plots as compared to all other treatments show no benefit from using pop-up fertilizers in 2012. Caution is advised if considering experimenting with pop-up fertilizer applications as product, rate, and precision of application all need to be considered. Study will continue in 2013.

Mention or use of any specific product does not indicate endorsement of that product or of the company that produces/distributes that product. Micro-500 is a micro-nutrient product containing 0.02% B, 0.25% Cu, 0.37% Fe, 1.20% Mn, and 1.8% Zn. MMREE is a micro-nutrient product containing 0.23% Ca, 0.35% Cu, 0.40% Fe, 0.50% Mn, and 0.70% Zn. Gavilon 30 is a 8-18-4 product containing 0.07% Cu, 0.20% Fe, 0.08% Mn, and 0.50% Zn. Pro-Germinator is a 9-24-3 product also containing 0.10% Fe. Sure-K is a 2-1-6 product.

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Herbicide-Resistant Weed Management Strategies in Roundup Ready Sugarbeet

Christy Sprague & Gary Powell, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: April 4, 2012
Soil Type: Clay loam; 2.2 OM; pH 7.8
Replicated: 4 times

Tillage: Conventional
Herbicides: see treatments
Varieties: HM-173RR
Population: 48,000 seeds/A

Table 1. Sugarbeet injury, weed control, sugarbeet yield and recoverable white sugar per acre (RWSA) for various herbicide programs.

Herbicide treatments [a]	Injury [b]	WEED CONTROL (at Harvest)			SUGARBEET	
		Common lambsquarters	Redroot pigweed	Common ragweed	Yield	RWSA
	— % —	— % control —			– ton/A –	— lb/A —
Roundup (22 oz) - applied 2X	0	96	99	94	23.3	5494
Roundup (33 oz) - applied 2X	0	98	99	95	23.4	5522
Nortron (PRE) fb. Roundup (33 oz)	10	93	99	93	23.3	5198
Roundup + Betamix (2 pt) fb. Roundup	9	88	99	92	22.5	5118
Roundup + Betamix (3 pt) fb. Roundup	8	94	98	95	24.6	6010
Roundup + Stinger fb. Roundup	15	90	96	95	22.7	5250
Roundup fb. Stinger + Roundup	0	96	98	99	22.9	5557
Roundup fb. Outlook + Roundup	0	96	99	96	22.4	5250
Roundup fb. Warrant + Roundup	0	92	99	93	21.7	4994
Roundup fb. Dual Magnum + Roundup	0	95	99	91	23.6	5427
$LSD_{0.05}$ [c]	4	6	2	7	n.s.	809

[a] POST herbicides were applied when sugarbeet were at the 2- and 6-leaf stages, except for the POST Roundup application after Nortron PRE was applied to 4-leaf sugarbeet. In not otherwise indicated, Roundup PowerMax was applied at 22 fl oz/A and all POST herbicide treatments included ammonium sulfate at 17 lb/100 gal. See recommendations in the MSU Weed Control Guide for Field Crops.

[b] Injury was evaluated May 22 (7 d after the 2-leaf application timing)

[c] Means within a column greater than least significant difference (LSD) value are different from each other.

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Herbicide-Resistant Weed Management Strategies in Roundup Ready Sugarbeet
Christy Sprague & Gary Powell, Michigan State University (continued)

Summary: This trial was conducted to compare various weed control systems using potential tank-mixture partners with glyphosate. Above is a subset of the treatments examined in this trial. Early in the season there was significant sugarbeet injury from PRE applications of Nortron or with treatments that included Betamix or Stinger in the first POST application. If Stinger, Outlook, Dual Magnum or Warrant were added to the 2nd POST application there was very little injury (data not shown). Sugarbeet were able to completely recover from initial injury by May 30. There initially were some differences in weed control between the herbicide treatments; however by harvest overall weed control was good. Sugarbeet yield of the untreated control was 3.1 tons/A and there was only 715 RWSA produced. This was an 87% and 88% reduction in yield and RWSA, respectively, compared with the highest yielding treatment in this trial. Overall there was no difference in yield between the different treatments, but there were some differences in RWSA. In general, there was not a significant advantage to applying a higher rate (33 fl oz/A) of glyphosate for weed control or yield by the end of the season. For the different tank-mixtures, including other products once sugarbeet was past the two-leaf stage generally had little effect on yield. However in the future, different tank-mix partners may need to be included in earlier applications depending on different herbicide-resistant weed situations. Tank-mixture combinations with the 2nd glyphosate application may help reduce the risk of the development of herbicide-resistant weeds.

Tolerance of Replanted Sugarbeet to Warrant

Christy Sprague & Gary Powell, Michigan State University

Location: Saginaw Valley Research and Extension Center
Planting Date: see treatments
Soil Type: Clay loam; 2.2 OM; pH 7.8
Replicated: 4 times

Tillage: Conventional
Herbicide Application Date: April 4, 2012
Varieties: Hilleshog 9042 RR
Population: 48,000 seeds/A

Table 1. Main effect of herbicide for sugarbeet planted in to herbicide residues at various weeks after application. Stand counts were taken 6 wks after planting and at harvest, yield, and recoverable white sugar per acre (RWSA) are also presented.

MAIN EFFECT [a]	STAND (6 WAT)	STAND (FINAL)	Yield	RWSA
HERBICIDE [b]	— plants/100ft —	— plants/100ft —	— ton/A —	— lb/A —
No herbicide	99 A[c]	93 A	16.1 B	3427 B
Warrant 3 pt	77 B	72 B	15.7 B	3212 B
Warrant 6 pt	73 B	74 B	16.5 B	3406 B
Dual Magnum	92 A	87 A	19.0 A	4044 A

[a] Main effect of herbicide are averaged over planting dates; sugarbeet were planted weekly for 7 weeks, including the day of application.
[b] Herbicides were applied on April 4 into a weed-free seed bed; the application rate of Dual Magnum was 1.33 pt/A.
[c] Means within a column with different letters are significantly different from each other.

Table 2. Main effect of planting date for sugarbeet planted in to herbicide residues at various weeks after application. Stand counts were taken 6 wks after planting and at harvest, yield, and recoverable white sugar per acre (RWSA) are also presented.

MAIN EFFECT [a]	STAND (6 WAT)	STAND (FINAL)	Yield	RWSA
PLANTING DATE [b]	— plants/100ft —	— plants/100ft —	— ton/A —	— lb/A —
Week-0	112 B[c]	112 B	23.1 A	4912 A
Week-1	128 A	126 A	21.3 A	5299 A
Week-2	97 C	92 C	18.4 B	3765 B
Week-3	78 D	71 D	17.5 B	3505 BC
Week-4	50 F	43 E	11.7 D	2130 D
Week-5	71 DE	70 D	15.0 C	3022 C
Week-6	60 EF	57 E	10.8 D	2024 D

[a] Main effect of planting dates are averaged over herbicides; herbicides were applied on April 4 into a weed-free seed bed; the application rate of Dual Magnum was 1.33 pt/A.
[b] Sugarbeet were planted weekly for 7 weeks, including the day of application.
[c] Means within a column with different letters are significantly different from each other.

Tolerance of Replanted Sugarbeet to Warrant
Christy Sprague & Gary Powell, Michigan State University
(continued)

Summary: Warrant is a new encapsulated acetochlor product that is being examined as a potential tank-mix partner with glyphosate in Roundup Ready sugarbeet. Preemergence applications of Warrant have been shown to cause significant sugarbeet injury and in some cases reductions in yield. If sugarbeet needs to be replanted after a lay-by application of Warrant sugarbeet injury, reductions in stand, and potential reductions of yield may be a concern. This study was conducted to determine the time interval needed between Warrant applications and replanting sugarbeet. Four different treatments a no herbicide control, Warrant at 1X (3 pt) and 2X (6 pt) the suggested labeled rate, and Dual Magnum a similar herbicide to Warrant currently labeled for use in sugarbeet were examined. In 2011, if sugarbeet were planted into the 1X rate of Warrant or Dual Magnum prior to the 4 week after application planting, sugarbeet stand was significantly lower than the no herbicide treatment. For the 2X Warrant application rate sugarbeet stand was lower until the 5 week planting. In 2012, sugarbeet stand averaged over all planting dates was reduced by Warrant (1X and 2X). But these applications did not affect yield or RWSA compared to the no herbicide control. Averaged over all herbicide applications, planting date significantly affected sugarbeet stand, yield, and RWSA. This year due to the drier weather conditions there was not a planting date by herbicide application interaction, and replanting sugarbeet into Warrant residues did not significantly reduce yield or RWSA compared with the no herbicide control. However, under conditions with more moisture this may be more apparent similar to the 2011 results.

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Volunteer Corn Effects on Roundup Ready Sugarbeet Yield & Quality Planted in Wide- & Narrow-Rows

Amanda Harden & Christy Sprague, Michigan State University

Location: East Lansing/SVREC (Richville)
Planting Dates: April 12 (EL); April 4 (SVREC)
Soil Type: Loam, 2.8 OM, pH 6.6 (EL)
Clay Loam, 2.2 OM, pH 7.8 (SVREC)
Herbicides: Roundup PowerMax (22 fl oz/A) + AMS

Variety: HM-173RR, Roundup Ready
Volunteer corn: 'F2' DeKalb 46-61 "SmartStax"
Tillage: Conventional
Population: 52,000 seeds/A
Replicated: 4 times
Row Widths: 30 & 15 inches

Table 1. Main effect of row width on sugarbeet yield and recoverable white sugar per acre (RWSA) averaged over volunteer corn populations.

	EAST LANSING		SVREC	
ROW WIDTH	Yield	RWSA	Yield	RWSA
	— tons/A —	— lbs/A —	— tons/A —	— lbs/A —
Wide (30-inches)	19.2 B[a]	5442 B	27.9 A	6759 B
Narrow (15-inches)	21.7 A	6379 A	28.5 A	7371 A

[a] Means within a column with different letters are significantly different from each other.

Table 2. Main effect of volunteer corn population on sugarbeet yield and recoverable white sugar per acre (RWSA) averaged over row widths.

VOLUNTEER CORN	EAST LANSING		SVREC	
POPULATION	Yield	RWSA	Yield	RWSA
___ plants/150 ft^2	— tons/A —	— lbs/A —	— tons/A —	— lbs/A —
0	22.7 A[a]	6389 A	30.1 A	7432 A
3	22.5 A	6439 A	29.7 A	7457 A
6	19.8 B	5845 AB	30.3 A	7474 A
12	21.3 AB	6138 AB	29.2 A	7533 A
24	19.6 B	5687 B	25.1 B	6222 B
48	16.8 C	4964 C	25.0 B	6276 B

[a] Means within a column with different letters are significantly different from each other.

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Volunteer Corn Effects on Roundup Ready Sugarbeet Yield & Quality Planted in Wide- & Narrow-Rows (continued)

Amanda Harden & Christy Sprague, Michigan State University

Summary: This trial was conducted to determine the impact of volunteer glyphosate-resistant corn on sugarbeet yield and quality in sugarbeet planted in wide and narrow rows. Various volunteer corn populations were planted the same day as sugarbeet with 'F2' corn seed harvested the previous year. All plots were maintained weed-free with applications of glyphosate. Although not presented, sugarbeet canopy closure was quicker in narrow rows at the SVREC location. Overall at both locations RWSA was higher in sugarbeet planted in narrow rows. This was also reflected in sugarbeet yield at East Lansing. Volunteer corn affected sugarbeet yield similarly between wide- and narrow-rows. At East Lansing, volunteer corn populations of 6 plants per 150 ft^2 significantly reduced yield and at SVREC volunteer corn populations of 24 plants per 150 ft^2 reduced yield. Di fferences in results between the two locations were most likely due to differences in corn growth and biomass. Extremely dry conditions early followed by better moisture later at SVREC resulted in better sugarbeet competition with volunteer corn. However, overall volunteer corn populations can have a significant effect on sugarbeet yield and quality and need to be managed as a significant weed problem.

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Control of Volunteer Roundup Ready Corn in Roundup Ready Sugarbeet

Amanda Harden & Christy Sprague, Michigan State University

Location: East Lansing/SVREC (Richville)
Planting Dates: April 12 (EL); April 4 (SVREC)
Soil Type: Loam, 2.8 OM, pH 6.6 (EL)
Clay Loam, 2.2 OM, pH 7.8 (SVREC)
Replicated: 4 times

Variety: HM-173RR, Roundup Ready
Volunteer Corn: 'F2' DeKalb 46-61 "SmartStax"
Tillage: Conventional
Population: 52,000 seeds/A; 30-inch rows

Table 1. Effect of application timing on volunteer corn control and sugarbeet yield and quality at SVREC

		Volunteer corn		Sugarbeet	
		Control[c]	Final biomass	Yield	RWSA
Removal Timing [a]	DAP[b]	— % —	— g/A —	— tons/A —	— lbs/A —
No corn	0	--	0 B	28.8 A	7399 A
V2	42	99 A[d]	5.9 B	31.8 A	7941 A
V3-V4	53	98 A	2.9 B	29.0 A	6917 A
V5-V6	62	95 B	60 B	29.4 A	7205 A
V6-V7	69	82 C	101 B	28.9 A	6860 A
V7	77	76 D	111 B	31.2 A	7529 A
Untreated	--	0 E	1287 A	28.9 A	6930 A

[a] Weeds were controlled at these volunteer corn stages using SelectMax or Assure II + Roundup PowerMax (22 fl oz/A) + AMS (17 lb/100 gal). There were no differences between the different herbicide treatments so results were combined.
[b] Days after planting, application time.
[c] Control was evaluated ~16 days after the last application timing.
[d] Means within a column with different letters are significantly different from each other.

Table 2. Effect of application timing on volunteer corn control and sugarbeet yield and quality at East Lansing.

		Volunteer corn		Sugarbeet	
		Control[c]	Final biomass	Yield	RWSA
Removal Timing [a]	DAP[b]	— % —	— g/A —	— tons/A —	— lbs/A —
No corn	0	--	0 B	21.4 B	5670 B
V2	49	99 Ad	0 B	21.9 B	5779 B
V4	63	98 A	23 B	22.6 AB	6103 AB
V6	68	98 A	17 B	24.5 A	6688 A
V10	79	91 B	162 B	20.8 B	5557 B
V10	86	73 C	408 B	21.6 AB	5999 B
Untreated	--	0 D	2971 A	15.3 C	4162 C

[a] Weeds were controlled at these volunteer corn stages using SelectMax or Assure II + Roundup PowerMax (22 fl oz/A) + AMS (17 lb/100 gal). There were no differences between the different herbicide treatments so results were combined.
[b] Days after planting, application time.
[c] Control was evaluated ~16 days after the last application timing.
[d] Means within a column with different letters are significantly different from each other.

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Control of Volunteer Roundup Ready Corn in Roundup Ready Sugarbeet

Amanda Harden & Christy Sprague, Michigan State University

(continued)

Summary: This trial was conducted to determine the impact of volunteer glyphosate-resistant corn on sugarbeet yield and quality in sugarbeet planted in wide and narrow rows. Various volunteer corn populations were planted the same day as sugarbeet with 'F2' corn seed harvested the previous year. All plots were maintained weed-free with applications of glyphosate. Although not presented, sugarbeet canopy closure was quicker in narrow rows at the SVREC location. Overall at both locations RWSA was higher in sugarbeet planted in narrow rows. This was also reflected in sugarbeet yield at East Lansing. Volunteer corn affected sugarbeet yield similarly between wide- and narrow-rows. At East Lansing, volunteer corn populations of 6 plants per 150 ft2 significantly reduced yield and at SVREC volunteer corn populations of 24 plants per 150 ft2 reduced yield. Differences in results between the two locations were most likely due to differences in corn growth and biomass. Extremely dry conditions early followed by better moisture later at SVREC resulted in better sugarbeet competition with volunteer corn. However, overall volunteer corn populations can have a significant effect on sugarbeet yield and quality and need to be managed as a significant weed problem.

Effect of Tile on Yield
Sherwood Farms, Breckenridge, MI - 2012

Trial Quality:	Fair	**Seed Rate:**	53,000	**Rhizoc Control:**	Poor Control: In Furrow & 6-8 Leaf
Variety:	C-RR074NT	**Soil Info:**	Loam		
Planted:	March 28	**Fertilizer:**	2x2: 20 gal of 19-17-0 + micros, Broadcast: 80# of N + Thiosul	**Cerc Control:**	Good Control: 1. Inspire XT + Copper, 2. Topsin + Agri Tin, 3. Eminent + Copper, 4. Agri Tin
Harv/Samp:	Oct 28/Oct 11				
Plot Size:	4 rep				
Row Spacing:	30 inch	**Prev Crop:**	Soybeans	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Over Tile	$1,996	**8438**	**299**	**28.3**	**20.1**	**95.0**
Between Tile	$1,731	**7321**	**294**	**24.9**	**19.7**	**95.1**
LSD 5%	—	ns (1894)	ns (14)	ns (5.9)	ns (0.9)	ns (1.0)
CV%	—	11	2	9.8	1.1	0.5

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trial was conducted to measure the effect that tile drainage has on beet yields and quality. The field had an approximate tile spacing of 58-60 foot. Harvest strips were taken as close as possible over the tile lines and in between. Due to harvest strip location and tramlines, strips were not centered exactly over or between tiles. No extreme rainfall events occurred on this trial during the season. Visual observation would suggest an improvement in plant health closer to tile lines including less Rhizoctonia. Three of the four replications averaged 4.8 tons improved yield over tile lines. In one replication, in between the tile had a one ton yield advantage, possibly due to severity and unevenness of Rhizoctonia infection. Good tile drainage is a very important management tool to optimize beet yields and to minimize risk.

Planting Date - Effect of Planting Date & Population on Sugarbeet Yield & Quality
Crumbaugh, Breckenridge, MI - 2012
(page 1 of 4)

Trial Quality: Good
Planted: May 22, May 29, April 5, April 13, April 21
Harvested: Oct 22
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 2 inches and thinned

Soil Info: Loamy Sand 1.9% OM, 6.9 pH
Previous Crop: Soybeans
Variety: HM-28RR
Seasonal Rainfall: 23.5 inches
Other Pests: Low Level of Cyst Nematodes

Rhizoc Control: Quadris, T-band and 6-8 lf Good Control
Cercospora Control: 4 Applic Good Control

Effect of Planting Date on Sugarbeet Yield & Quality

Averaged Over all Beet Populations									
Planting Date	$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Emerg	% Canopy Close Jun	% Canopy Close Aug
Mar 22	**1917**	**8112**	**265**	**30.6**	**18.0**	**94.9**	65.7	**62**	**93**
Mar 29	1768	7482	**262**	28.5	**17.8**	**94.8**	**76.9**	49	**92**
Apr 5	1752	7411	**264**	28.0	**17.9**	**94.8**	72.6	46	**90**
Apr 13	1654	6996	**264**	26.4	**18.0**	**94.8**	65.4	44	88
Apr 21	1559	6594	**263**	25.0	**17.9**	**94.7**	69.7	39	87
Average	1730	7319	264	27.7	17.9	94.8	70.1	48	90
LSD 5%	62.9	266.1	ns(3.8)	1.0	ns(0.2)	ns(0.3)	3.2	4.0	2.9

Effect of Population on Sugarbeet Yield & Quality

Averaged Over all Planting Dates									
Beets/100' Plan	Beets/100' Actual	$/A	RWSA	RWST	T/A	% Sugar	% CJP	% Canopy Close Jun	% Canopy Close Aug
200	**203**	**1948**	**8240**	**271**	**30.4**	**18.2**	**95.3**	**50.8**	**91.6**
150	153	**1911**	**8084**	**270**	**29.9**	**18.2**	**95.2**	**48.9**	**91.2**
100	102	1800	7613	265	28.7	18.0	94.8	46.4	**90.5**
75	77	1627	6885	259	26.5	17.7	94.5	46.5	88.6
50	53	1365	5773	252	22.9	17.4	94.1	45.4	89.1
Average	65	1496	6329	256	24.7	17.6	94.3	46.0	88.9
LSD 5%	3.0	64.5	273.0	3.4	0.9	0.2	0.3	2.2	2.0

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an avg. RWST of 275.

Summary: Sugarbeets were planted at weekly intervals starting on March 22 and ending on April 21, 2012. At each of the 5 planting dates, 5 sugarbeet populations were established (50, 75, 100, 150 and 200 beets/100 row ft). Emergence conditions were favorable on each of the 5 planting dates. Sugarbeet emergence was quicker at the later planting dates. Sugarbeet yields and grower payments were significantly higher at earlier planting dates and with higher sugarbeet populations.

Planting Date - Effect of Planting Date & Population on Sugarbeet Yield & Quality
Crumbaugh, Breckenridge, MI - 2012
(page 2 of 4)

All Dates & Populations

Planted		Beets/100' Planned	Beets/100' Actual	$/A	RWSA	RWST	T/A	% Sugar	% CJP
1st	Mar 22	200	200	**2158**	**9129**	**276**	**33.1**	**18.5**	**95.4**
1st	Mar 22	150	148	**2122**	**8979**	**272**	**33.1**	**18.2**	**95.6**
2nd	Mar 29	150	154	**2050**	**8675**	**272**	**31.8**	**18.3**	**95.2**
1st	Mar 22	100	101	2001	8464	267	**31.7**	18.0	95.0
3rd	Apr 5	200	206	2000	8460	**270**	**31.4**	**18.1**	**95.3**
2nd	Mar 29	200	198	1968	8326	**269**	**31.0**	**18.1**	**95.0**
3rd	Apr 5	150	154	1925	8146	**271**	30.1	**18.2**	**95.3**
4th	Apr 13	200	206	1846	7811	**273**	28.6	**18.3**	**95.3**
4th	Apr 13	100	103	1817	7686	267	28.8	**18.1**	94.8
3rd	Apr 5	100	100	1794	7592	264	28.7	18.0	94.8
5th	Apr 21	200	205	1766	7473	**270**	27.8	18.1	**95.3**
1st	Mar 22	75	76	1752	7413	258	28.8	17.7	94.2
4th	Apr 13	150	156	1730	7317	268	27.3	18.1	**95.1**
5th	Apr 21	150	154	1726	7302	**269**	27.2	**18.2**	95.0
2nd	Mar 29	100	102	1721	7282	261	27.9	17.7	94.8
2nd	Mar 29	75	77	1696	7177	259	27.7	17.6	94.8
5th	Apr 21	100	103	1664	7042	268	26.3	**18.2**	94.8
4th	Apr 13	75	76	1657	7008	262	26.7	17.9	94.7
3rd	Apr 5	75	78	1559	6597	263	25.1	18.0	94.5
1st	Mar 22	50	50	1554	6575	251	26.1	17.3	94.2
3rd	Apr 5	50	52	1480	6261	253	24.8	17.4	94.2
5th	Apr 21	75	78	1473	6231	256	24.4	17.5	94.5
2nd	Mar 29	50	52	1406	5950	249	23.8	17.3	94.1
4th	Apr 13	50	59	1219	5156	251	20.5	17.4	94.1
5th	Apr 21	50	52	1164	4923	255	19.3	17.6	94.1

Average	118	1730	7319	264	27.7	17.9	94.8
LSD 5%	6.6	144.3	610.5	7.6	2.1	0.4	0.6
CV %	4.9	7.3	7.3	2.5	6.6	1.9	0.6

Bold: Results are not statistically different from top-ranking treatment in each column.
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Planting Date - Effect of Planting Date & Population on Sugarbeet Yield & Quality
Crumbaugh, Breckenridge, MI - 2012
(page 3 of 4)

Trial Information

Planting	Planting Date	% Emerg	Thinned	
			Date	If stage
1	Mar 22	66	May 4	2-4 lf
2	Mar 29	77	May 16	2-4 lf
3	Apr 5	73	May 21	2-4 lf
4	Apr 13	65	May 24	2-4 lf
5	Apr 21	70	May 29	2-4 lf

Planting 1 (March 22)				
	Date	Days	GDD	Rain
Planted	Mar 22			
Emerg	Apr 3	12	127	1.1
Cotyl	Apr 10	7	81	.1
2 lf	Apr 24	14	206	1.6
4 lf	May 8	14	256	1.0
6 lf	May 19	11	286	.5
8 lf	May 27	8	268	.3
	Total	66	1224	4.6

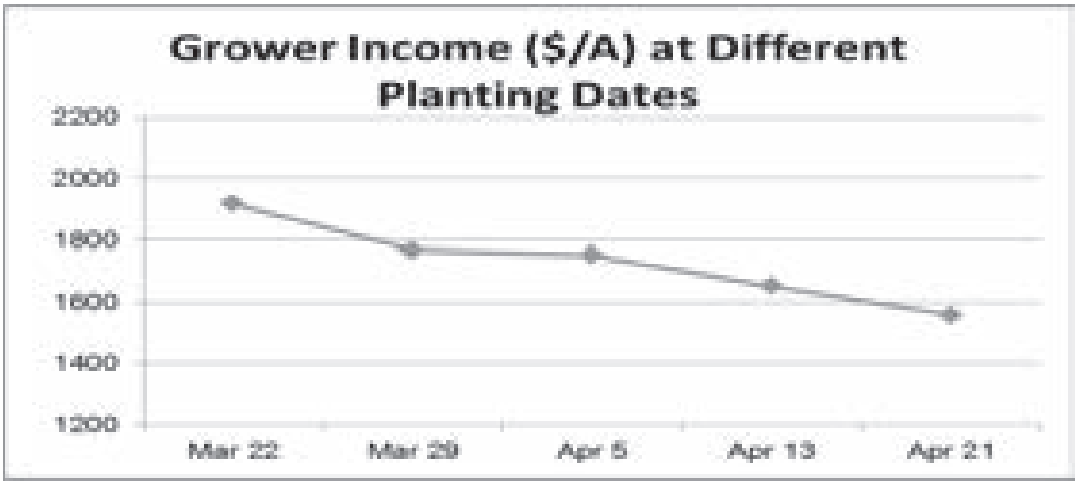
Planting 2 (March 29)				
	Date	Days	GDD	Rain
Planted	Mar 29			
Emerg	Apr 10	12	121	.5
Cotyl	Apr 20	10	163	1.5
2 lf	May 2	12	155	.4
4 lf	May 12	10	238	.9
6 lf	May 23	11	318	.4
8 lf	May 30	7	245	.5
	Total	62	1240	4.2

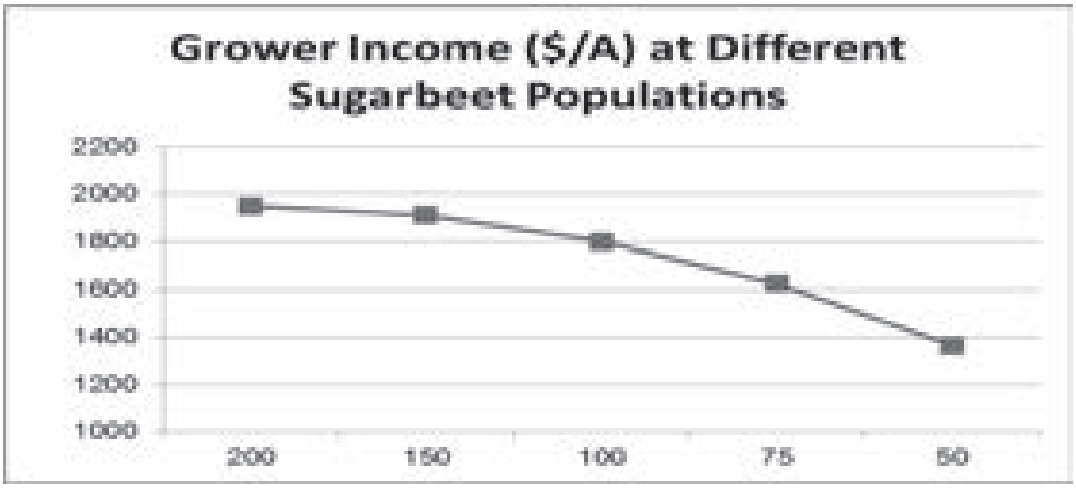
Planting 3 (April 5)				
	Date	Days	GDD	Rain
Planted	Apr 5			
Emerg	Apr 17	12	183	1.0
Cotyl	Apr 30	8	151	1.0
2 lf	May 5	5	123	.8
4 lf	May 14	9	213	.3
6 lf	May 25	11	341	.2
8 lf	Jun 1	7	202	1.9
	Total	52	1213	5.2

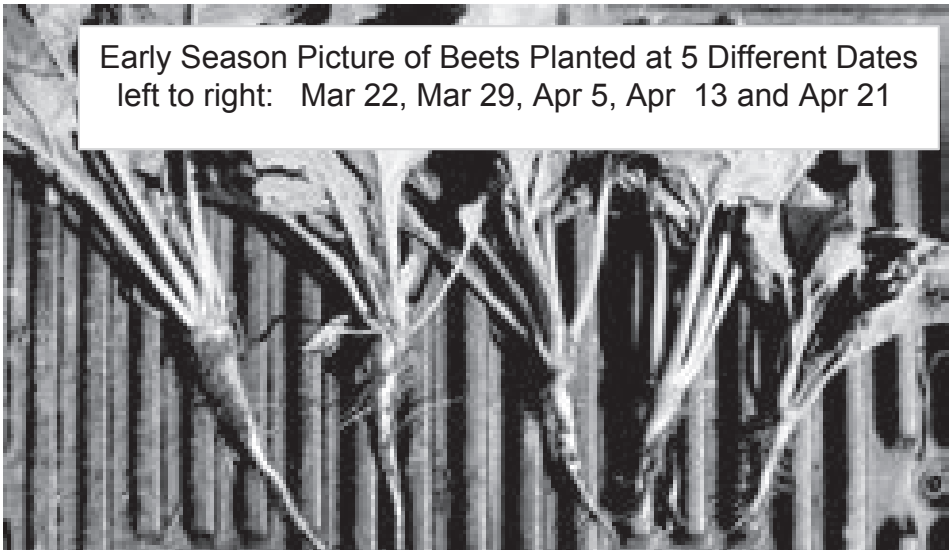
Planting 4 (April 15)				
	Date	Days	GDD	Rain
Planted	Apr 13			
Emerg	Apr 24	11	169	1.5
Cotyl	May 3	9	148	1.3
2 lf	May 9	6	130	.2
4 lf	May 16	7	179	.4
6 lf	May 28	12	396	.3
8 lf	Jun 3	6	147	1.9
	Total	51	1169	5.6

Planting 5 (April 21)				
	Date	Days	GDD	Rain
Planted	Apr 21			
Emerg	May 2	8	112	.5
Cotyl	May 10	8	184	1.1
2 lf	May 15	5	137	.4
4 lf	May 20	5	146	.5
6 lf	Mar 29	9	308	.3
8 lf	Jun 6	8	192	2.1
	Total	43	1079	4.9

Planting Date - Effect of Planting Date & Population on Sugarbeet Yield & Quality
Crumbaugh, Breckenridge, MI - 2012
(page 4 of 4)







Early Season Picture of Beets Planted at 5 Different Dates
left to right: Mar 22, Mar 29, Apr 5, Apr 13 and Apr 21

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Early Harvest - Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment Average of 6 Trials Conducted Between 2010 & 2012 (page 1 of 7)

Harvest Date	Payment		RWSA	RWST	T/A	% Sugar	% CJP	Amino	B/100'	GDD*	Rain Inch
	$/A	$/Ton									
Nov 1	**$2,372**	$66	**10269**	**287**	**35.8**	**19.1**	**95.4**	**4.7**	**192**	15	2.3
Oct 15	**$2,350**	$72	9238	**283**	32.7	**19.1**	**95.1**	8.7	**199**	19	1.1
Sep 15	**$2,305**	**$86**	6519	242	27.1	16.5	**95.0**	8.4	**196**	30	1.0
Oct 1	**$2,240**	$80	7444	265	28.2	18.1	94.5	**7.2**	**200**	23	0.9
Sep 1	$2,052	**$85**	5133	213	23.9	15.1	93.4	11.4	**197**	36	0.6
Aug 15	$1,823	**$82**	3977	178	22.0	12.9	93.1	10.8	**192**	35	5.5
Average	$2,191	$79	7097	245	28.3	16.8	94.4	8.5	196.0	26.3	1.9
LSD 5%	209.4	5.1	597.0	15.4	1.8	0.9	0.6	2.7	ns(10)	3.6	1.7
CV %	8.0	5.4	7.1	5.3	5.4	4.5	0.5	26.9	3.9	11.4	75.9

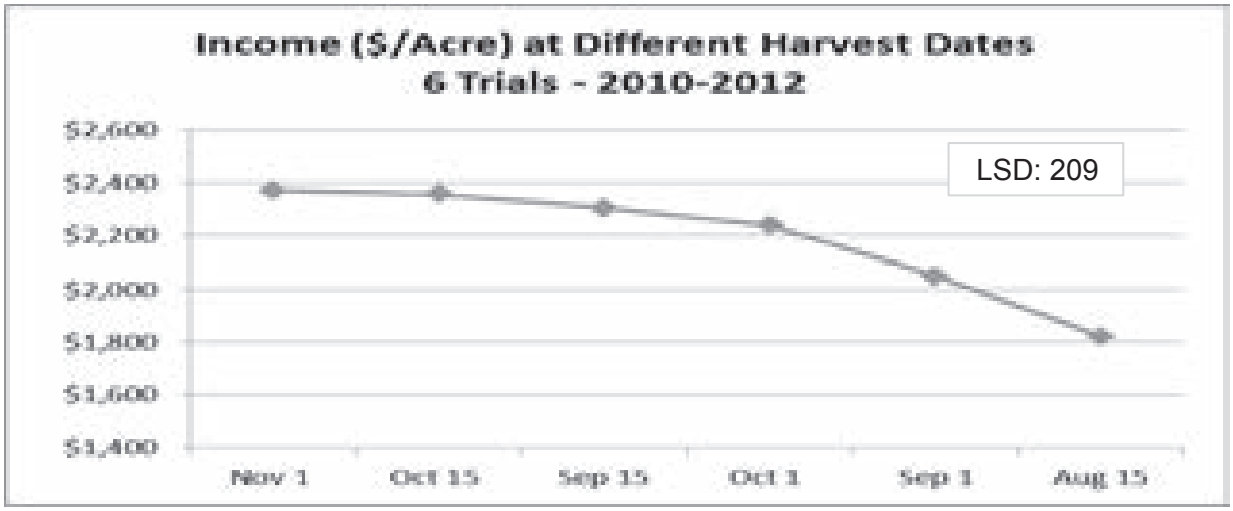
***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.

Rain Inch: The amount of rain for 2 weeks before the harvest date.

Bold: Results are not statistically different from top-ranking treatment in each column

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Growers are producing sugarbeets at levels that challenge our factories to process all of the beets. The decision has been made to begin harvest early rather than reducing acreage or pushing processing late into March. We have been conducting harvest date trials for the past 3 years to determine the yield and quality of sugarbeets harvested early, mid and late. The Cooperative has developed an early harvest incentive payment to compensate growers for low yields and quality during early harvest. The information above incorporates the early harvest payment schedule. Weather conditions have been favorable each of the past 3 years for sugarbeets to keep adding tons and sugar through October. The GDD (growing degree days) and rainfall in the chart above, show the weather conditions 2 weeks prior to each harvest date. Three years of data show that there is not much difference with respect to income between mid September and early November. Very early harvest, in August, has paid less. Our data agrees with Sugarbeet Advancement strip trial information. We plan to conduct 3 harvest date trials per year for the foreseeable future. Predicting harvest income will become more accurate with multiple years of data covering different weather conditions.



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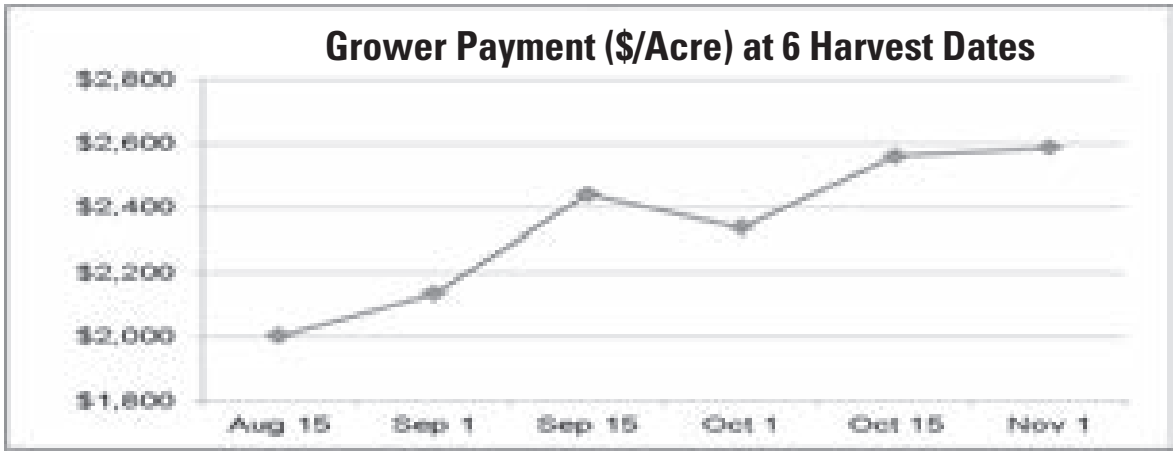
Early Harvest - Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment Average of 3 Trials (Blumfield, Bay City & Midland) - 2012 (page 2 of 7)

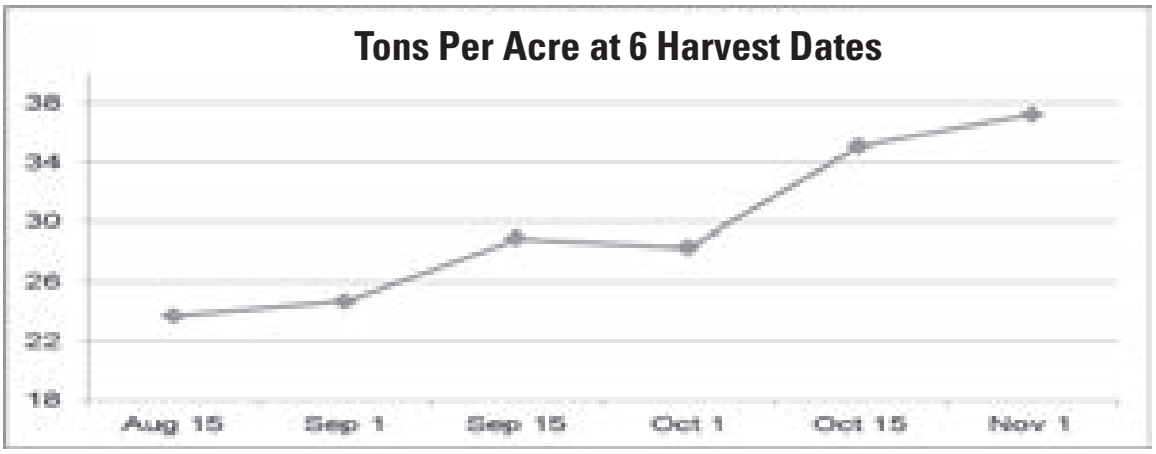
Harvest	Early Delivery					%	%		Beets		Rain
Date	$/A	$/Ton	RWSA	RWST	T/A	Sugar	CJP	Amino	100'	GDD*	Inch
Nov 1	**$2,586**	$70	**11219**	**301**	**37.2**	**19.8**	**96.0**	**4.1**	198	18	7.3
Oct 15	**$2,560**	$73	10123	**289**	35.1	**19.3**	**95.5**	**6.4**	**212**	15	0.5
Sep 15	**$2,440**	**$84**	6927	239	28.9	16.1	**95.5**	8.2	**203**	29	1.3
Oct 1	**$2,338**	**$83**	7813	278	28.3	**18.8**	94.9	**6.6**	**211**	22	0.3
Sep 1	$2,134	**$86**	5355	215	24.7	15.1	94.0	11.3	**203**	38	1.7
Aug 15	$2,003	**$82**	4404	181	23.7	13.0	93.5	12.1	199	36	2.2
Average	$2,343	$80	7640	251	29.7	17.0	94.9	8.1	204.1	26	2.2
LSD 5%	315.8	7.7	677.0	19.5	1.9	1.1	1.1	3.2	13.0		
CV %	7.4	5.3	4.9	4.3	3.6	3.6	0.7	21.4	3.5		

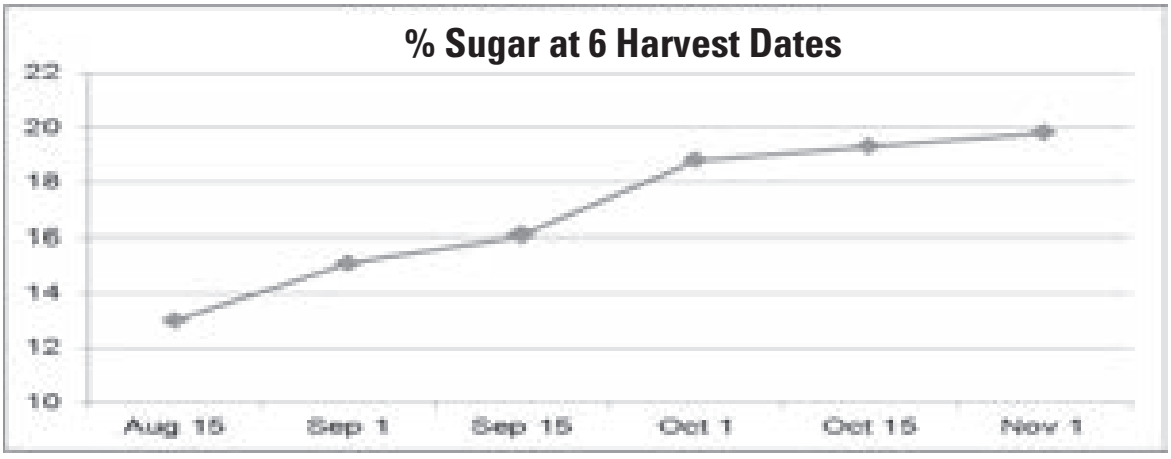
***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.
Rain Inch: The amount of rain for 2 weeks before the harvest date.
Bold: Results are not statistically different from top-ranking treatment in each
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Sugarbeet yield increased by 1.23 tons per week and the quality increased by 10.9 lbs of RWST per week (0.62 pts sugar/week) during the harvest period. Rainfall was above normal (134%) and temperatures were slightly above normal during the harvest period. The early season premium leveled out the payments, especially from Sep 15 to Oct 15. The Sep 1 and Aug 15 payments were significantly lower than the other harvest dates. Sugarbeets were planted at a 4.1 inch spacing in 22 inch rows. Plots were thinned lightly, just taking out doubles. Plots were hand harvested, topped, weighed and quality samples were sent to the MARL lab for analysis.

Early Harvest - Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment Average of 3 Trials (Blumfield, Bay City & Midland) - 2012 (page 3 of 7)







Early Harvest
Evaluate the Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment - 2012
(page 4 of 7)

Blumfield, MI - 2012

Trial Quality: Good
Planted: April 12
Harvested: 6 Dates
Plot Size: 6 rows X 35 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Soil Info: Clay Loam 2.0%OM, 7.8 pH
Previous Crop: Oil Seed Radish
Other Pests: None
Variety: C-RR059

Rhizoc Control: No Quadris App
Cercospora Control: 4 Applic Good Control
Seasonal Rainfall: 21.9 inches

Harv Date	$/A	$/Ton	RWSA	RWST	T/A	% Sugar	% CJP	Amino	Beets/ 100'	GDD	Rain Inch
Oct 15	**$2,688**	$70	**10629**	**276**	**38.6**	**18.6**	**95.1**	8.0	**214**	15	1.5
Sep 15	**$2,632**	$80	7473	227	32.9	15.6	**95.0**	10.5	**204**	29	1.3
Nov 1	**$2,624**	$65	**11401**	**284**	**40.1**	**19.0**	**95.4**	**4.7**	**201**	18	2.7
Oct 1	**$2,512**	$77	8396	259	32.5	17.7	94.4	8.3	**205**	22	0.4
Sept 1	**$2,457**	**$83**	6166	208	29.6	14.3	**95.1**	12.1	**201**	38	0.5
Aug 15	$2,409	**$84**	5296	185	28.6	13.2	93.9	10.0	183	35	3.5
Average	$2,554	$77	8227	240	33.7	16.4	94.8	9.0	201.1	26	1.6
LSD 5%	245.1	2.5	806.9	8.2	3.1	0.5	0.6	2.1	18.1		
CV %	8.1	2.7	8.3	2.9	7.8	2.6	0.5	19.9	7.6		

Shaffner, Midland, MI - 2012

Trial Quality: Good
Planted: April 25
Harvested: 6 Dates
Plot Size: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Soil Info: Silty Clay 2.9% OM, 7.7 pH
Previous Crop: Dry Beans
Other Pests: Low Level Cyst Nematodes
Variety: C-RR059

Rhizoc Control: 0 Applic Very Little Rhizoc
Cercospora Control: 4 Applic Good Control
Seasonal Rainfall: 25.0 inches

Harv Date	$/A	$/Ton	RWSA	RWST	T/A	% Sugar	% CJP	Amino	Beets/ 100'	GDD*	Rain Inch
Sep 15	**$3,243**	**$88**	9209	251	36.7	16.7	96.2	**4.1**	**195**	29	1.8
Oct 15	**$3,166**	$75	12518	296	**42.3**	19.5	**95.9**	**4.5**	**204**	15	1.5
Nov 1	**$3,147**	$72	**13638**	**312**	**43.7**	**20.4**	**96.4**	**3.7**	**182**	18	1.9
Oct 1	$3,003	$86	10037	287	35.0	19.2	95.3	**4.4**	**210**	22	0.2
Sep 1	$2,870	**$91**	7202	228	31.7	15.9	94.0	8.2	**195**	38	0.6
Aug 15	$2,632	**$91**	5788	199	29.0	14.1	94.0	10.3	**196**	35	9.3
Average	$3,010	$84	9732	262	36.4	17.6	95.3	5.9	197.1	26	2.5
LSD: 5%	203.0	2.6	723.1	7.8	2.0	0.4	0.6	1.2	ns(37.0)		
CV %	5.7	2.6	6.3	2.5	4.7	2.1	0.5	16.8	15.8		

***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.
Rain Inch: The amount of rain for 2 weeks before the harvest date.
Bold: Results are not statistically different from top-ranking treatment in each column
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Early Harvest
Evaluate the Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment - 2012
(page 5 of 7)

Helmreich, Bay City, MI - 2012

Trial Quality: Good
Planted: April 4
Harvested: 6 Dates
Plot Size: 6 rows X 35 ft, 6 reps
Row Spacing: 22 inch
Seeding Rate: 4.1 inches

Soil Info: Clay Loam, 2.6% OM, 7.9 pH
Previous Crop: Soybeans
Other Pests: None
Variety: C-RR059

Rhizoc Control: Quadris T-band 6-8 lf, Good Control
Cercospora Control: 3 Applic Good Control
Seasonal Rainfall: 23.5 inches

Harv Date	$/A	$/T	RWSA	RWST	T/A	% Sugar	% CJP	Amino	Beets/ 100'	GDD*	Rain Inch
Nov 1	**$1,988**	$71	**8618**	**308**	**28.0**	**20.2**	**96.2**	**4.0**	**210**	18	1.7
Oct 15	$1,827	$75	7223	295	24.5	19.6	95.6	6.7	**217**	15	2.2
Oct 1	$1,498	**$86**	5006	288	17.4	19.4	94.9	7.2	**218**	22	0.3
Sep 15	$1,443	$84	4099	238	17.2	16.2	95.2	9.9	**209**	29	0.9
Sept 1	$1,074	$84	2696	210	12.8	15.1	93.0	13.5	**212**	38	0.4
Aug 15	$968	$72	2128	158	13.5	11.7	92.7	15.9	**217**	35	9.0
Average	$1,466	$79	4962	250	18.9	17.0	94.6	9.5	214	26.0	1.6
LSD 5%	121.6	1.9	417.6	6.6	1.5	0.4	0.5	2.3	ns(17.4)		
CV %	7.0	2.1	7.1	2.2	6.5	1.9	0.5	20.6	6.8		

***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.
Rain Inch: The amount of rain for 2 weeks before the harvest date.
Bold: Results are not statistically different from top-ranking treatment in each column
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

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Early Harvest - Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment Average of 2 Trials (Reese & Bay City) - 2011 (page 6 of 7)

Trial Quality: Good
Planted: Reese; May 5
Bay City; May 6
Harvested: 6 Dates
Plot Size: 6 rows X 38 ft, 6 reps
Variety: SX-1291RR

Soil Info: Reese; Silt Loam, 2.8% OM, 7.9 pH
Bay City; Sandy Clay Loam, 2.9% OM, 7.5 pH
Fertility: Levels adequate
Reese - 135 and Bay City - 100 lbs added N
Cercospora: Control good
Rhizoctonia: Control good

Harvest Date	$/A	$/Ton	RWSA	RWST	T/A	% Sugar	% CJP	Amino	Beets 100 ft	GDD*	Rain Inch
Oct 1	**$2,200**	$81	7195	**264**	27.3	**18.1**	**94.4**	**5.4**	**182**	23	1.8
Oct 15	**$2,139**	$75	8241	**290**	28.5	**19.6**	**94.9**	10.0	**179**	25	0.3
Nov 1	**$2,126**	$64	**9134**	**273**	**33.7**	**18.5**	**94.8**	**5.4**	**185**	12	3.2
Sep 15	**$2,088**	**$91**	5819	253	23.0	17.4	**94.3**	7.6	**187**	31	0.5
Sep 1	$1,744	**$85**	4304	209	20.4	15.1	92.7	7.5	**188**	34	1.1
Aug 15	$1,570	**$85**	3403	184	18.4	13.3	92.9	**6.4**	**182**	34	2.9

Average	$1,978	$80	6349.2	246	25.2	17.0	94.0	7.05	183.9		
LSD 5%	288.6	7.8	537	26.2	2.8	1.6	1.1	2.3	ns(19.7)		
CV %	5.7	3.8	3.3	4.2	4.3	3.6	0.4	12.7	4.2		

***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.
Rain Inch: The amount of rain for 2 weeks before the harvest date.
Bold: Results are not statistically different from top-ranking treatment in each column
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Sugarbeet yields increased by 1.4 tons per acre per week and sugar levels increased by 0.6 points per week in 2011. Weather conditions were favorable for late season growth. Grower payments between Sep 15 and Nov 1 were similar. Aug 15 and Sep 1 payments were lower.

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Early Harvest - Influence of Harvest Dates on Sugarbeet Yield, Quality & Grower Payment - 2010 (page 7 of 7)

Trial Quality: Good
Harvested: 5 Dates
Plot Size: 6 rows X 35 ft, 6 reps
Variety: HM-131RR
Row Spacing: 30 inches
Fertility: Sufficient Levels
Added N: 100 lbs
Rhizoc Control: Good
Cercospora Control: Fair
Other Pests: Low Level Cyst Nematodes

Harv Date	$/A	$/Ton	RSWA	RWST	T/A	% Sugar	% CJP	Amino	GDD*	Rain Inch
Sep 1	**$2,422**	**$85**	6129	214	28.6	15.4	92.7	**19.8**	37	0.1
Sep 15	**$2,336**	$79	6696	228	29.4	15.7	94.7	10.6	28	1.0
Nov 1	$2,224	$62	**9688**	**271**	**35.8**	**18.3**	**95.0**	10.0	26	1.0
Oct 15	$2,140	$63	8575	254	**33.8**	17.5	94.2	12.8	19	0.9
Oct 1	$2,024	$68	6839	229	29.8	16.2	93.4	12.6	15	1.1
Average	$2,229	$71	7585	239	31.5	16.6	94.0	13.2	25	0.8
LSD: 5%	165.1	3.2	552.7	9.5	2.6	0.6	0.7	3.4		
CV %	6.2	3.7	6.1	3.3	6.9	2.9	0.6	21.6		

***GDD:** Are calculated by adding the (daily high + daily low) dividing by 2 and subtracting 34.
Rain Inch: The amount of rain for 2 weeks before the harvest date.

Bold: Results are not statistically different from top-ranking treatment in each column
$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.

Summary: Sugarbeet yields increased by .83 tons per acre per week and sugar levels increased by .33 points per week in 2010. Weather conditions were favorable for late season growth. Grower payments were similar throughout the harvest period.

Date of Harvest - 2012
Chris & Angie Guza, Ubly, MI
(page 1 of 2)

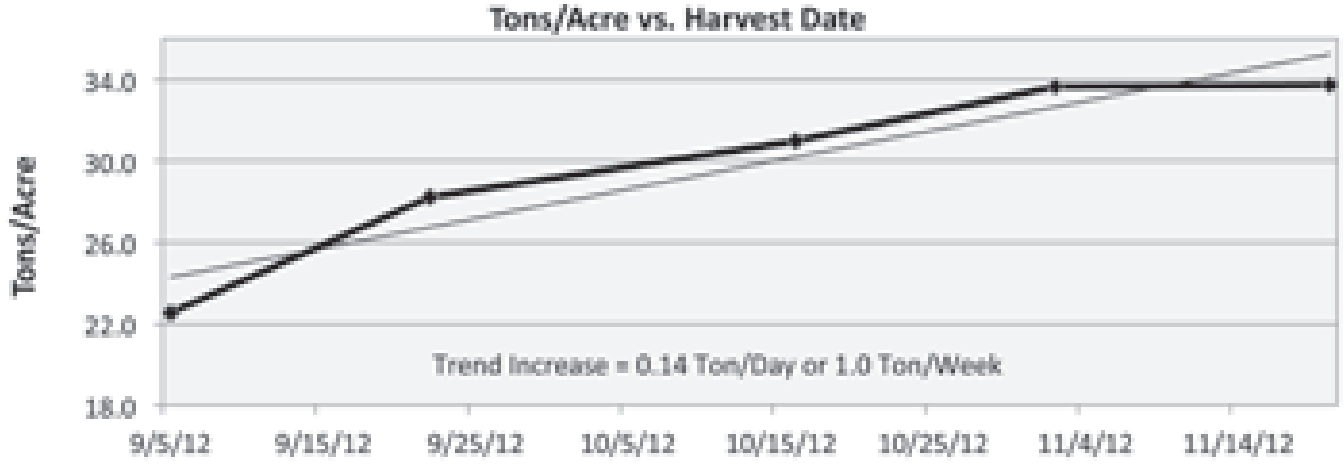
Trial Quality:	Excellent	**Seed Rate:**	66,000	**Rhizoc Control:**	Excellent Cont: Quadris In Furrow & 6-8 Leaf
Variety:	B-17RR32	**Soil Info:**	Loam		
Planted:	March 27	**Fertilizer:**	2x2: 36-17-0 + micros, Sidedress: 22 gal of 28%	**Cerc Control:**	Excellent Cont: 1. Inspire XT + EBDC, 2. Quadris + EBDC, 3. Eminent + EBDC, 4. Proline + EBDC
Harv/Samp:	See Treatments				
Plot Size:	4 reps				
Row Spacing:	22 inch	**Prev Crop:**	Corn	**Other Pests:**	Mustang : In Fur. & Post

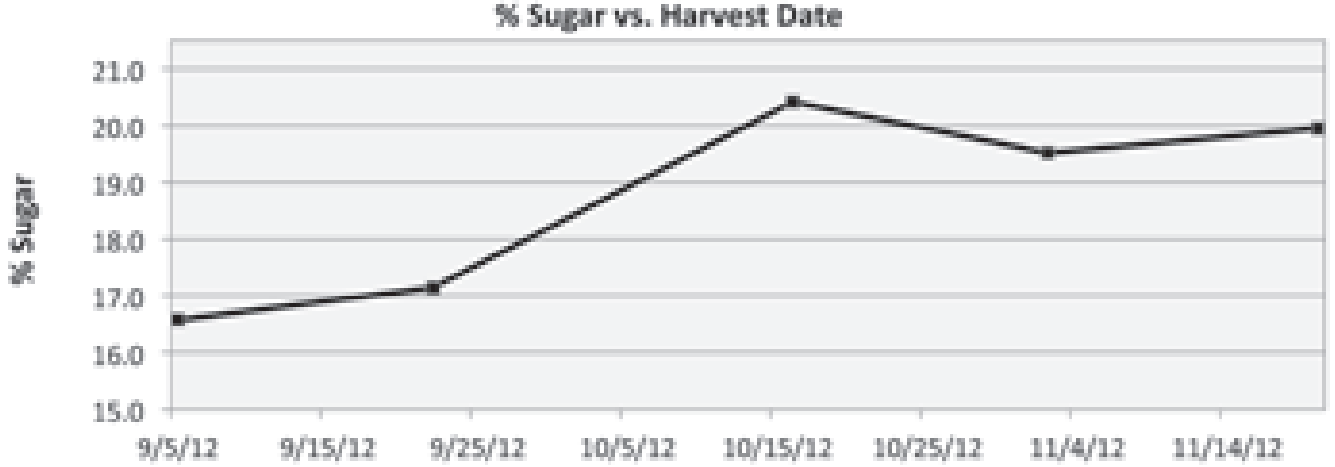
Harvest Date	RWSA	RWST	T/A	% Sugar	% CJP	Revenue			
						Adjust %	Early Dig Charge	Net Payment - Base $65	$/A
Sept 5	**5448**	**242**	**22.5**	**16.6**	**94.6**	**163.0%**	**$0.00**	**$93.18**	**$2,100**
Sept 22	**7249**	**257**	**28.2**	**17.1**	**95.8**	**139.2%**	**$0.00**	**$84.48**	**$2,385**
Oct 16	**9540**	**308**	**31.0**	**20.4**	**95.6**	**105.6%**	**$0.00**	**$76.87**	**$2,382**
Nov 2	**9871**	**293**	**33.7**	**19.5**	**95.5**	**100.0%**	**$2.92**	**$66.39**	**$2,235**
Nov 20	**10241**	**303**	**33.8**	**20.0**	**96.0**	**100.0%**	**$2.92**	**$68.79**	**$2,322**

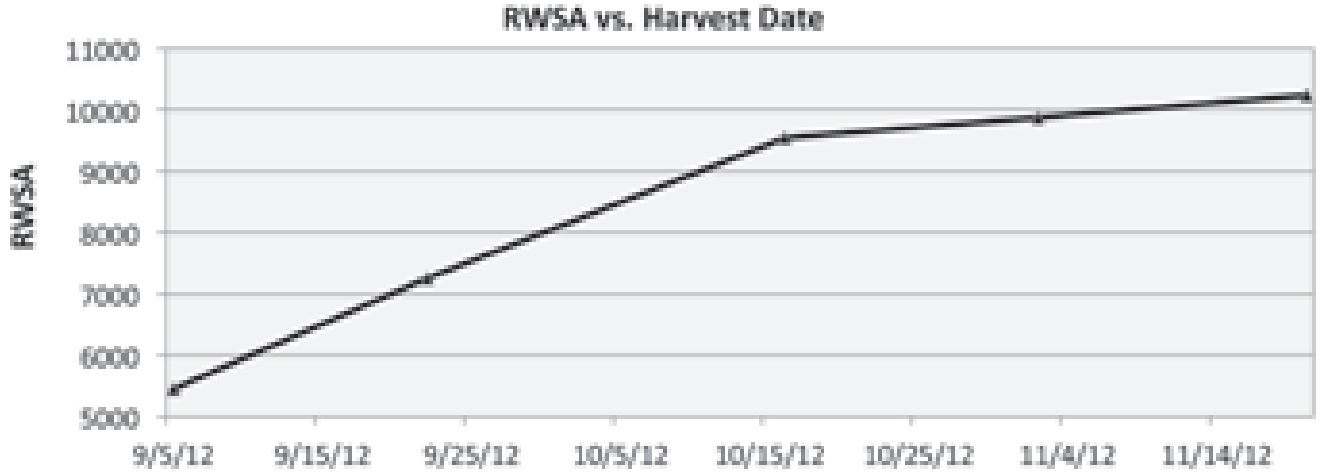
$/A: Gross dollars per acre assuming $65 payment and company average RWST of 275.

Comments: This field had experienced dry weather prior to the first dig on September 5, 2012, which did increase harvest loss. BEETcast data indicates approximately 2 inches of rainfall occurred between each of the 1st/2nd, 2nd/3rd and 3rd/4th digs. Field was wet just prior to the fourth dig. Sugar content dropped because of increased moisture and hydration. Six harvest strips (reps) where harvested each harvest date with a ROPA Tiger. Two sugar samples were taken from each strip for quality analysis. Quality appeared to peak on October 16 and tonnage gains improved up to the November 2 harvest date. In November, cooler and drier conditions may have had an impact. Tonnage gained from 1st and last harvest date averaged about 1.0 ton per week. The average tonnage gained per week between 1st and 4th harvest was 1.26 tons. These gains in tonnage and quality appear to be similar with previous data generated. When comparing revenue, keep in mind the reduction in cost to truck less tons in early delivery would economically favor the early delivery dates. The difference in trucking cost is not accounted for in the revenue calculation. Also, keep in mind that the first harvest date had high harvest loss and dry conditions that impacted yield and revenue.

Date of Harvest - 2012
Chris & Angie Guza, Ubly, MI
(page 2 of 2)







Sugarbeet Advancement

Scalping vs. Topping
D & B Karg Farms, Harbor Beach, MI - 2012

Scalping vs. Topping on an Ideal Stand

Trial Quality:	Excellent	**Seed Rate:**	62,000	**Rhizoc Control:**	Quadris In Furrow (7 oz) & 8 Leaf (14 oz)
Variety:	C-RR827	**Soil Info:**	Kilmanagh Loam		
Planted:	April 4	**Fertilizer:**	2x2: 50-60-25 + micros; Sidedress: 90# N by AA	**Cerc Control:**	1. Inspire XT + EBDC, 2. Headline + EBDC, 3. Inspire XT + EBDC
Harv/Samp:	October 29				
Plot Size:	5 reps				
Row Spacing:	22 inch	**Prev Crop:**	Wheat	**Other Pests:**	None

Treatment	$/A	RWSA	RWST	T/A	% Sugar	% CJP
Topped	$2,757	**11649**	**333**	**35.0**	**21.9**	**95.9**
Scalped	$2,743	**11608**	**337**	**34.4**	**22.1**	**96.0**
LSD 5%	—	ns (411)	ns (7)	ns (1.1)	ns (0.4)	ns (0.3)
CV%	—	2	2	1.8	1.1	0.2

Scalping vs. Topping on a Thinner Stand

Trial Quality:	Excellent	**Seed Rate:**	55,000	**Rhizoc Control:**	Quadris In Furrow (7 oz) & 8 Leaf (14 oz)
Variety:	C-RR827	**Soil Info:**	Sand & Clay Areas		
Planted:	April 14	**Fertilizer:**	2x2: 50-60-25 + micros; Sidedress: 90# N by AA	**Cerc Control:**	1. Inspire XT + EBDC, 2. Headline + EBDC, 3. Inspire XT + EBDC
Harv/Samp:	October 28				
Plot Size:	6 reps				
Row Spacing:	22 inch	**Prev Crop:**	Drybeans	**Other Pests:**	None

Treatment	$/Acre	RWSA	RWST	T/A	% Sugar	% CJP
Topped	$2,222	**9403**	**326**	**28.9**	**21.7**	**95.1**
Scalped	$2,200	**9307**	**325**	**28.6**	**21.7**	**95.1**
LSD 5%	—	ns (197)	ns (5.4)	ns (0.4)	ns (0.3)	ns (0.2)
CV%	—	1	1	1.0	0.8	0.1

$/A: Gross payment unless noted as net. Calculated assuming a $65 payment and an average RWST of 275.
Bold: Results are not statistically different from top-ranking treatment in each column.

Comments: Trials were conducted to compare scalping with a Ropa Tiger harvester to an excellent job of topping. The same trial was done in a field with an ideal stand and a field with a thin stand (some areas under 100 beets per 100'). All of the harvesting was done with the Tiger and the topped strips had the scalpers raised so that they were not doing anything. The Tiger was equipped with Micro Scalpers and did an ideal job of taking off a small scalp. Each harvested strip had 4 quality samples taken for a total of 20 and 24 samples for each treatment per trial. Weights were taken using truck weights that went across a piler to eliminate truck tare.

MICHIGAN STATE UNIVERSITY Extension

Modeling Heat Exchange in Sugarbeet Piles in Michigan

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Team Members: Linda Hanson, Mitch McGrath, Mona Shaaban, and Greg Clark

In Michigan, where beets are stored in piles exposed to the weather, increasing losses coincide with the warming of the environment as winter transitions to spring. In 2004-2005, the sugarbeet industry lost approximately $25 million due to losses incurred in the storage piles. Uncharacteristically warm late winter temperatures and larger pile dimensions lead to excessive sprouting and decay with the result that thousands of tons of harvested beet roots were unusable. The unusual conditions of 2004 storage season highlight the need to understand factors that lead to sugar losses late in the storage campaign.

We determined, therefore to try to describe the relationship between the temperature of the environment and the temperature of the beets in the pile as a function of location within the pile. This data will allow us to develop a mathematical model that will be useful in the prediction of beet temperatures as a function of the dimensions of the pile, air temperature and storage duration. Data depicting pile temperatures will help to give us a clearer picture of the changing biology of the beet root pile throughout the storage season.

Progress:
In 2011, wiring and tubing harnesses for monitoring temperature, O_2, and CO_2 were installed in a beet pile at the Gera road piling grounds north of Frankenmuth at the time of pile construction (Fig. 1). Approximately ½ mile of lines (tubing containing thermocouples within or thermocouples alone) were installed in the pile in four harnesses. There were 8 or 9 sampling locations along each harness distributed equidistant along

Figure 1. Completed installation of instrumentation harnesses at the Gera Road piling ground in September of 2011. Greg Clark and Curtis Dietrich pictured.

Modeling Heat Exchange in Sugarbeet Piles in Michigan (continued)

the buried harness length. One harness ran vertically down the face of the pile at its midpoint, the second harness ran diagonally across the face of the pile from its outer shoulder to the base at its midpoint, the third harness ran along the base of the pile to its midpoint and the fourth harness (thermocouples only) was embedded in the soil surface along the base of the pile to its midpoint. A total of 36 locations in the pile were monitored. Temperature data was collected weekly by hand and hourly by datalogger. Concentrations of O_2 and CO_2 were measured weekly by pumping a gas sample from the tubing into a combination O_2/CO_2 analyzer. When CO_2 levels were recorded above ambient, ethylene analysis was performed on a gas sample collected into a volatile sampling bag. Data collection was terminated on January 7, 2012 in anticipation of pile disassembly on Jan. 10.

Results:
Gas exchange measurements indicated that there was no significant build-up of either CO_2 or O_2 in the beet pile, even during the warmest days (data not shown). The temperature of the pile typically declined from the outside to the inside of the pile. The warmest portion of the pile was at its center (Figs. 2 and 3) and typically ranged from 45 to 50 °F. The portion of the pile near the ground surface was also quite warm relative to the upper portions of the pile. We found that the pile temperature was quite responsive to the air temperature and changed rapidly on a daily basis. During warm periods when the air temperature was in the mid-30s, large portions of the pile (>70%) had root temperatures above 45 °F. During cooler periods when the air temperature was in the low 20s, about 30% of the pile still had temperatures in 40 °F range. At these times, almost half of the pile had temperatures below freezing.

We are currently processing the data to calculate the rate of heat gain and heat loss due to heat gain from the ground and respiratory processes and heat loss to the environment. The data will be used to assess the impact of pile architecture on root temperature and sugar loss as a function of winter temperatures.

Impacts:
The work on pile temperatures should give us a means to assess the potential for maintaining root quality as a function of winter temperatures and storage duration and assist in developing strategies to mitigate the influence of global climate change. Future work will include modeling beet temperatures in vented piles.

Modeling Heat Exchange in Sugarbeet Piles in Michigan (continued)

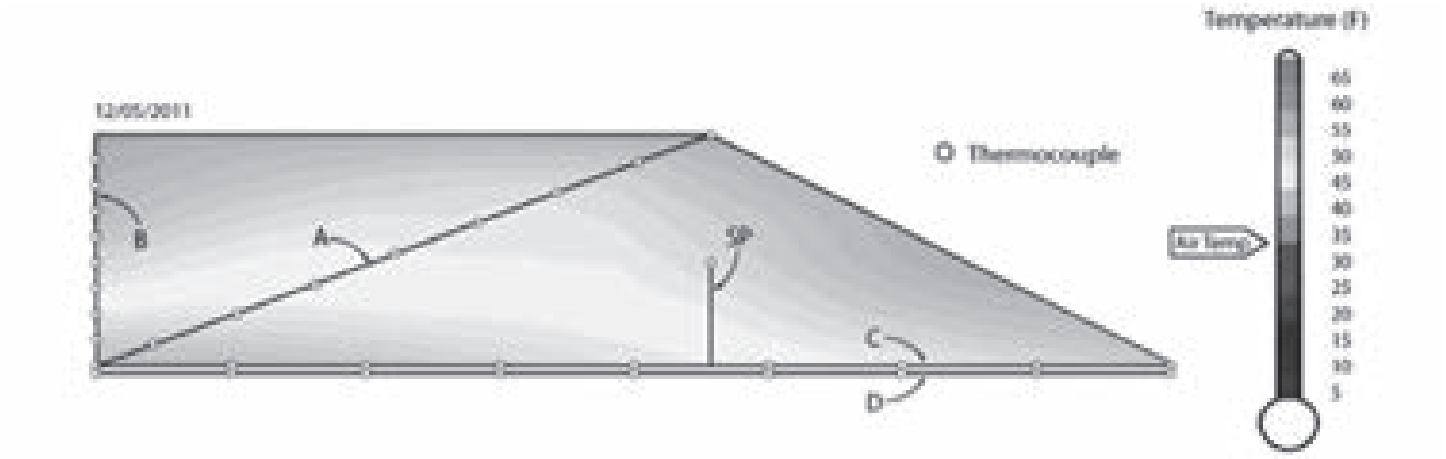

Figure 2. Temperature profile of Gera Road beet pile on December 5, 2011. Air temperature averaged 35 ºF on this date. A, B, C, D and SP indicate five thermocouple harnesses; harness D was embedded approximately 2 inches into the soil. White circles indicate locations of individual thermocouples.

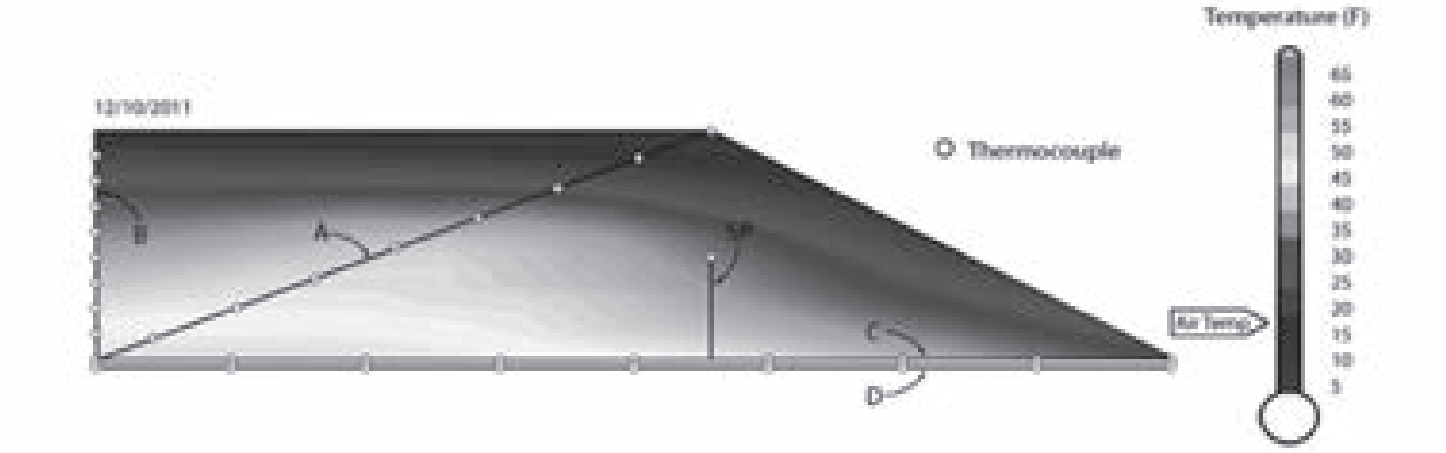

Figure 3. Temperature profile of Gera Road beet pile on December 10, 2011. Air temperature averaged 17 ºF on this date. A, B, C, D and SP indicate five thermocouple harnesses; harness D was embedded approximately 2 inches into the soil. White circles indicate locations of individual thermocouples.

Miscellaneous Trials - Sugarbeet Seed Priming, Rhizoctonia Seed Treatments, Nematode Trials, Insecticide Trials, Nutritional Trials 2012 Research

Michigan Sugar Company conducted 40 miscellaneous trials in 2012, ten of which were assisting MSU and USDA researchers with their work. We partner with MSU and USDA because it allows them to conduct research in sugarbeets that they would otherwise not be able to do. Trials conducted for seed and chemical companies included sugarbeet seed priming, Rhizoctonia seed treatments, Rhizoctonia spray trials, Cercospora spray trials, sugarbeet pile storage trials, insecticide trials, nutritional spray trials and nematode trials. We are compensated for trials that we conduct for seed or chemical companies. Even though the data is not public, this work ultimately provides a benefit for our Cooperative. Companies do not have the staff to conduct this work in Michigan. Results from these trials are not public at this time, however, in general we see advances being made with seed priming, Rhizoctonia seed treatments and new products working their way towards the Michigan sugarbeet market.