MICHIGAN SUGARBEET REACh
Research & Education Advisory Council

2019 Research Results

REACh/SUGARBEET ADVANCEMENT COMMITTEE LIST
2019 VOTING MEMBERSHIP

23 Voting Members

Company	Name	Terms Remaining	Expire
Michigan Sugar Company	Jim Ruhlman (5th Member)	Permanent	
	Dennis Bischer		
	Jim Stewart		
	Corey Guza		
Michigan Sugar Field Consultants (4 years)	Kerrek Griffes	4	2023
	Kevin Messing	2	2021
	Cassie Sneller	3	2022
Michigan Sugar Company District Board Members (1 year)	Darrin Siemen	1	2020
	Troy Schuette	1	2020
	Peter Maxwell (Secretary)	1	2020
Michigan Sugar Company At Large Growers (3 years)	Scott Grifka	3	2022
	Kurt Hrabal (Treasurer)	2	2021
	Eric Gentner	1	2020
	Andy Shaffner (Vice Chairman)	3	2022
Michigan State University, University of Guelph, and USDA (3 years)	Linda Hanson	1	2020
	Amanda Tracey	3	2022
	Jamie Willbur	3	2022
Sugar Beet Seed Company (2 years)	Andy Bernia	2	2021
Agri-Business Retail (2 years)	Kyle Edler	2	2021
Agri-Business Manufacturing (2 years)	David Reif	1	2020
Michigan Sugar Company Board of Directors (1 year)	Clay Crumbaugh	1	2020
	Mark Sylvester (Chairman)	1	2020
SBA Director	Daniel Bublitz	Permanent	

Ex-Officio Members

Company	Name
Chairman of Board of Directors - MSC	Rick Gerstenberger
CEO of Michigan Sugar Company	Mark Flegenheimer

MICHIGAN SUGARBEET REACh
Research Education Advisory Council

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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MICHIGAN SUGAR

2019 Research Results

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Control of Rhizoctonia Root Rot (*Rhizoctonia solani*) with Fungicides in Sugarbeets
Blumfield East, Richville, MI - 2019

Trial Quality: Fair
Variety: SX - 1278
Planted: Apr 24
Harvested: Oct 8
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Sandy Clay Loam
% OM: 2.7 **pH:** 8.3 **CEC:** 10.1
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Radish

Rhizoc Level: Low
Cerc Control: Good
Problems: Low Rhizoc level
Seeding Rate: 4.5 inches
Rainfall: 29.04 inches
Beets/100 ft: ~ 221

Application: JD 3520 tractor mounted plot sprayer, compressed air, 30 psi, 15.3 gpa- Foliar 7" band
Monosem 6-row Agronomy Planter, compressed air, 30 psi, 9 gpa - IF, 3.5" band

No.	Treatment	Rate/A	Applic Timing	Applic Method	Dead Beets / 100 ft	Vigor Rating* 0-10	Net $/A	RWST	RWSA	T/A	% SUC
19	Quadris Fl	7 fl oz.	At Plant	In-Fur	0	**7.9**	**$1,875**	**10812**	263	**41.2**	**17.2**
18	SDHI Nichino	3.1 fl oz.	At Plant	In-Fur	0	7.5	**$1,683**	**9706**	260	**37.3**	**16.9**
	NIS	0.125 % v/v	At Plant	In-Fur							
13	Quadris Fl	10 fl oz.	At Plant	In-Fur	0	**8.0**	**$1,898**	**10942**	262	**41.8**	**17.1**
	Serifel	4 oz.	At Plant	In-Fur							
9	Xanthion A	1.8 fl oz.	At Plant	In-Fur	0	7.6	**$1,683**	**9702**	263	36.9	**17.3**
	Xanthion B	9 fl oz.	At Plant	In-Fur							
	Quadris Fl	14.3 fl oz.	8 lf	Banded							
8	Xanthion A	1.8 fl oz.	At Plant	In-Fur	0	**7.8**	**$1,792**	**10334**	258	**40.1**	**16.8**
	Xanthion B	9 fl oz.	At Plant	In-Fur							
7	Quadris Fl	10 fl oz.	At Plant	In-Fur	0	**7.9**	**$1,754**	**10116**	249	**40.6**	16.3
	Exp T.M.	1.8 fl oz.	At Plant	In-Fur							
16	Propulse	10 fl oz.	At Plant	In-Fur	0.5	**8.1**	**$1,864**	**10746**	262	**41.1**	**17.0**
	Quadris Fl	14.3 fl oz.	8 lf	Banded							
20	Quadris Fl	14.25 fl oz.	4 lf	Banded	0.8	**7.9**	**$1,860**	**10725**	265	**40.5**	**17.3**
17	Propulse	10 fl oz.	At Plant	In-Fur	0.8	**7.8**	**$1,856**	**10702**	258	**41.4**	**16.9**
11	Proline 480 SC	5.7 fl oz.	At Plant	In-Fur	0.8	**8.2**	**$1,865**	**10756**	252	**42.8**	**16.5**
3	Quadris Fl	14.25 fl oz.	8 lf	Banded	0.8	**7.8**	**$1,724**	**9940**	256	**38.8**	**16.7**
15	Quadris Fl	10 fl oz.	At Plant	In-Fur	1.0	7.5	**$1,644**	**9476**	262	36.2	**17.0**
	QST 713 HICFU 150 FS	12.8 fl oz.	At Plant	In-Fur							
	Proline 480 SC	5.7 fl oz.	8 lf	Banded							
6	Quadris Fl	15.5 fl oz.	18 lf	Broadcast	1.0	7.6	$1,603	9243	258	35.9	**16.9**
4	Quadris Fl	10 fl oz.	At Plant	In-Fur	1.0	**7.8**	**$1,808**	**10423**	265	**39.5**	**17.4**
	Quadris Fl	14.3 fl oz.	8 lf	Banded							

***NIS= Preference**
*** Vigor:** 0 to 10 ratings, 10 is best.
Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Rhizoctonia Root Rot (*Rhizoctonia solani*) with Fungicides in Sugarbeets
Blumfield East, Richville, MI - 2019

No.	Treatment	Rate/A	Applic Timing	Applic Method	Dead Beets / 100 ft	Vigor Rating* 0-10	Net $/A	RWSA	RWST	T/A	% SUC
12	Proline 480 SC	5.7 fl oz.	At Plant	In-Fur	1.3	7.6	**$1,764**	**10168**	260	**39.2**	**17.1**
	Quadris Fl	14.3 fl oz.	8 lf	Banded							
2	Quadris Fl	10 fl oz.	In-Fur		1.3	**8.0**	**$1,832**	**10560**	258	**40.8**	**16.9**
14	Quadris Fl	10 fl oz.	At Plant	In-Fur	1.5	7.6	**$1,749**	**10085**	259	**39.0**	**16.9**
	Serenade ASO	2 qt.	At Plant	In-Fur							
	Proline 480 SC	5.7 fl oz.	8 lf	Banded							
5	Quadris Fl	15.5 fl oz.	8 lf	Broadcast	1.5	**7.9**	**$1,722**	**9930**	251	**39.6**	**16.5**
21	Quadris Fl	14.25 fl oz.	12 lf	Banded	1.8	**7.7**	**$1,753**	**10106**	265	**38.2**	**17.3**
1	Untreated Check				1.8	7.6	$1,628	9384	258	36.3	**16.9**
10	Headline	9 fl oz.	At Plant	In-Fur	2.5	7.5	**$1,802**	**10388**	267	**38.9**	**17.3**
Average					0.86	7.76	$1,769.4	10202.0	259.5	39.33	16.96
LSD 5%					N.S.	0.5	268.0	1545.3	N.S.	5.5	0.9
CV%					203.7	4.6	10.7	10.7	4.4	10.0	3.8

*** Vigor:** 0 to 10 ratings, 10 is best.

Comments: The site was a good quality field and emergence was good. The disease level was low and variable and not a lot was learned from this trial. Leafspot was well controlled. Most fungicide treatments outyielded the untreated treatment.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Rhizoctonia Root Rot (*Rhizoctonia solani*) with Fungicides in Sugarbeets
Wackerle, Pinconning, MI - 2019

Trial Quality: Fair
Variety: SX - 1278
Planted: May 14
Harvested: Sept 30
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Sandy Clay Loam
% OM: 2.3 **pH:** 7.7 **CEC:** 9.0
P: Above Opt **K:** Opt
Mn: Medium **B:** Low
Added N: 135 lbs.
Prev Crop: Wheat

Rhizoc Level: Medium
Cerc Control: Good
Problems: Uneven disease
Seeding Rate: 4.5 inches
Rainfall: 19.43 inches
Beets/100 ft: ~ 208

Application: JD 3520 tractor mounted plot sprayer, compressed air, 30 psi, 15.3 gpa- Foliar 7" band
Monosem 6-row Agronomy Planter, compressed air, 30 psi, 9 gpa - IF, 3.5" band

No.	Treatment	Rate/A	Applic Timing	Applic Method	Dead Beets / 100 ft	Vigor Rating* 0-10	Net $/A	RWSA	RWST	T/A	% SUC
15	Quadris Fl	10 fl oz.	In-Fur	T-band	**0.3**	**7.9**	**$1,646**	**9399**	262	**35.9**	**16.9**
	QST 713 HICFU 150 FS	12.8 fl oz.	In-Fur	T-band							
	Proline 480 SC	5.7 fl oz.	8 lf	Banded							
2	Quadris Fl	10 fl oz.	In-Fur	T-band	**0.6**	**7.8**	**$1,660**	**9479**	264	**36.0**	**17.0**
4	Quadris Fl	10 fl oz.	In-Fur	T-band	**0.7**	**7.5**	**$1,572**	**8972**	257	**35.0**	**16.6**
	Quadris Fl	14.25 fl oz.	8 lf	Banded							
18	SDHI Nichino	3.1 fl oz.	In-Fur	T-band	**1.4**	**8.0**	**$1,607**	**9173**	260	**35.3**	**16.8**
	NIS	.125 % v/v	In-Fur	T-band							
7	Quadris Fl	10 fl oz.	In-Fur	T-band	**1.6**	**7.8**	**$1,591**	**9084**	257	**35.3**	**16.6**
	Exp T.M.	1.8 fl oz.	In-Fur	T-band							
17	Propulse	10 fl oz.	In-Fur	T-band	**1.8**	**7.8**	**$1,598**	**9121**	256	**35.8**	**16.5**
16	Propulse	10 fl oz.	In-Fur	T-band	**1.8**	**7.7**	**$1,631**	**9314**	258	**36.2**	**16.6**
	Quadris Fl	14.25 fl oz.	8 lf	Banded							
12	Proline 480 SC	5.7 fl oz.	In-Fur	T-band	**2.1**	**7.6**	**$1,579**	**9012**	254	**35.5**	**16.4**
	Quadris Fl	14.25 fl oz.	In-Fur	T-band							
3	Quadris Fl	14.25 fl oz	4 lf	Banded	**2.3**	**7.9**	**$1,616**	**9228**	257	**35.9**	**16.6**

***NIS = Preference**
*** Vigor:** 0 to 10 ratings, 10 is best.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Rhizoctonia Root Rot (*Rhizoctonia solani*) with Fungicides in Sugarbeets
Wackerle, Pinconning, MI - 2019

No.	Treatment	Rate/A	Applic Timing	Applic Method	Dead Beets / 100 ft	Vigor Rating* 0-10	Net $/A	RWSA	RWST	T/A	% SUC
14	Quadris Fl	10 fl oz.	In-Fur	T-Band	**2.3**	**7.8**	**$1,564**	**8931**	258	**34.7**	16.6
	Serenade ASO	2 qt.	In-Fur	T-Band							
	Proline 480 SC	5.7 fl oz.	8 lf	Banded							
11	Proline 480 SC	5.7 fl oz.	In-Fur	T-Band	2.8	**7.6**	**$1,618**	**9239**	262	**35.3**	16.9
6	Quadris Fl	15.5 fl oz.	18 lf	Broadcast	2.8	**7.9**	**$1,533**	**8751**	253	**34.6**	16.3
13	Quadris Fl	10 fl oz.	In-Fur	T-Band	2.9	**7.8**	**$1,570**	**8963**	258	**34.8**	16.7
	Serifel	4 oz.	In-Fur	T-Band							
5	Quadris Fl	15.5 fl oz.	8 lf	Broadcast	2.9	**7.5**	**$1,581**	**9028**	252	**35.8**	16.4
9	Xanthion A	1.8 fl oz.	In-Fur	T-Band	3.1	**7.5**	**$1,566**	**8941**	253	**35.4**	16.3
	Xanthion B	9 fl oz.	In-Fur	T-Band							
	Quadris Fl	14.25 fl oz.	8 lf	Banded							
10	Headline	9 fl oz.	In-Fur	T-Band	3.2	7.4	**$1,622**	**9257**	258	**35.9**	16.7
8	Xanthion A	1.8 fl oz.	In-Fur	T-Band	4.6	**7.5**	**$1,536**	**8770**	257	**34.1**	16.6
	Xanthion B	9 fl oz.	In-Fur	T-Band							
1	Untreated Check				8.6	6.8	$1,435	8191	250	32.7	16.2
Average					2.54	7.65	$1,584.8	9047.4	256.9	35.23	16.59
LSD 5%					2.0	0.5	129.0	736.5	N.S.	2.5	N.S.
CV%					70.1	5.4	7.1	7.1	4.4	6.1	4.0

*** Vigor:** 0 to 10 ratings, 10 is best.

Comments: The trial was located in a good quality field. Rhizoctonia root rot was present at low to medium levels but was not evenly distributed (patchy spots). Registered and experimental fungicides were evaluated for root rot in the trial. Treatments applied in-furrow (3.5 inch T-Band) provided the best results. Treatments that included Quadris gave better control than most other treatments. Propulse, Proline and the Nichino SDHI provided good results. All treatments outyielded the untreated. The sugarbeet stand was good and none of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluation of in-furrow and banded fungicides treatments to manage Rhizoctonia root and crown rot of sugar beet

Chris Bloomingdale and Jaime Willbur, Michigan State University

Location: Frankenmuth (SVREC)	**Treatment Timings:** In-Furrow & Banded at 6-8 leaves
Planting Dates: May 6, 2019	**Pesticides:** see table
Soil Type: Loam	**O.M.:** 5.0 **pH:** 7.5
Replicates: 4	**Variety:** C-G351NT

Summary: Stand counts from 5 Aug show significant differences in percent stand loss among treatment programs (P<0.001). Mean values for stand death ranged between 7.1-74.2%. Programs 4, 6, 7, and 12 all exhibited significantly lower percent stand loss than program 1, the non-treated control. DX values were significantly different among programs (P<0.0001). Programs 4, 6, 7, 8, 12, and 13 resulted in statistically similar DX values (15.4-29.0%) and were significantly lower than the control (55.3%). There were also significant differences among mean yields of treatment programs (P<0.0001). Programs 6, 7, 8, 12, and 13, ranging from 6.8 to 10.1 t/A, yielded significantly higher than the non-treated control (3.9 t/A). All other tested programs did not have yields significantly different from the control. Overall, disease pressure was high in this trial and greater than would be expected in most commercial fields. All data presented should be interpreted relative to the trial, and not as averages for Michigan production.

Table 1. Disease index (root rating at harvest), seasonal plant loss, and yield parameters of fungicide programs.

No.	Treatment, Rate[a]	Application Type[b]	Stand Loss (%)[c]	Disease Index (%)[d]	Yield (t/A)
7	Excalia, 3 fl oz	Banded	7.1 e	18.0 gh	10.1 a
6	Excalia, 2 fl oz	Banded	19.4 de	29.0 d-h	9.3 ab
12	Serenade ASO, 2 qt Quadris, 9.2 fl oz Proline, 5.7 fl oz	In-Furrow In-Furrow Banded	20.9 de	27.1 e-h	6.9 bc
4	Quadris, 12 fl oz	Banded	21.1 de	26.9 f-h	4.5 c-f
15	Serenade ASO, 2 qt Proline, 5.7 fl oz	In-Furrow Banded	25.9 c-e	37.0 b-f	5.3 c-e
2	Quadris, 12 fl oz	In-Furrow	26.7 c-e	33.1 c-g	4.5 c-f
8	Excalia, 4 fl oz	Banded	28.3 c-e	15.4 h	4.0 d-f
13	Exp[f] 2, 12.8 fl oz Quadris, 9.2 fl oz Proline, 5.7 fl oz	In-Furrow In-Furrow Banded	32.7 b-e	24.9 f-h	3.1 ef
3	Vertisan, 30 fl oz	Banded	34.6 b-e	50.1 ab	6.2 cd
9	Moncut, 25 fl oz	In-Furrow	39.1 b-d	34.7 b-f	3.9 d-f
5	Priaxor, 8 fl oz	Banded	42.5 b-d	43.0 a-e	7.0 bc
1	Non-Treated Control	-	55.5 a-c	55.3 a	5.3 c-e
11	Exp 1, 4.65 fl oz	In-Furrow	55.8 a-c	56.8 a	6.8 bc
10	Exp 1, 3.1 fl oz	In-Furrow	60.4 ab	43.9 a-d	2.0 f
14	Serenade ASO, 2 qt	In-Furrow	74.2 a	48.0 a-c	4.8 c-f

[a] All rates are listed as measure of a product per acre.
[b] In-furrow treatments were applied at planting, banded applications were applied at the 6-8 leaf stage.
[c] Column values followed by the same letter were not significantly different based on Fisher's Protected LSD (α=0.05); if no letter, then the effect was not significant.
[e] Disease index was calculated by multiplying the disease incidence (0-100%) by the mean symptomatic root severity (1-7) and dividing by 7.
[f] Exp=Experimental Compound.

Azoxystrobin sensitivity of *Rhizoctonia solani* isolates from Michigan sugar beet fields

Jaime F. Willbur[1], Chris Bloomingdale[1], Cameron Pincumbe[1], Carly Hendershot[1], Douglas H. Minier[1], Linda E. Hanson[2]
[1]Michigan State University; [2] United States Department of Agriculture—Agricultural Research Service

Introduction

Rhizoctonia root and crown rot (RRCR) is caused by *Rhizoctionia solani* Kühn and continues to be a major pathogen of sugar beet. RRCR is managed in Michigan with Quadris (a.i. azoxystrobin, Syngenta) that is widely applied in-furrow at planting or banded at the 6-8 leaf stage. Azoxystrobin is a quinone outside inhibitor (Qol) which targets a single site to inhibit fungal respiration. This inhibition method has a high risk for developing fungicide resistance.

Objective: Determine azoxystrobin sensitivity of *Rhizoctonia solani* isolates from Michigan

Methods

- *R. solani* isolates collected from Michigan sugar beet fields between 2015-2018
- Isolates were screened and compared to baseline isolates when exposed to V8 broth with salicylhydroxamic acid and azoxystrobin at concentrations of 0, 0.01, 0.1, 1, 10, and 100 µg/ml^{-1}
- After 96 hours, mycelial mats were removed and dried for 48 hours to determine colony mass
- Percent inhibition was calculated using the equation:

100-[(response amended/response non amended)*100]

Discussion

In amended broth studies, isolates were sensitive to azoxystrobin concentrations below label rates and were comparable to baseline isolates, except those exhibiting hypersensistive responses (Fig. 1). Azoxystrobin insensitivity was not observed in Michigan *R. solani* populations, however continued testing is necessary.

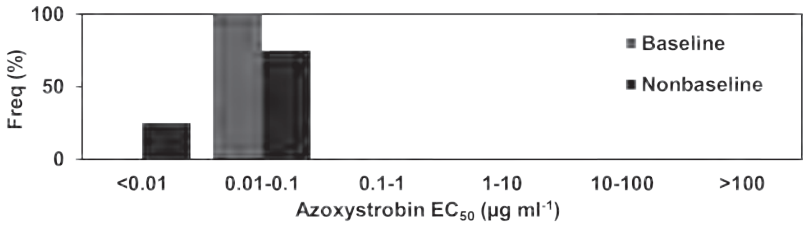

Figure 1. Frequency of isolates within sensitivity categories. Isolates sensitive to concentrations less than label rates: 0.4 fl oz 1000 row ft^{-1} (low; 1.35 µg ml^{-1}) to 0.8 fl oz 1000 row ft^{-1} (high; 2.7 µg ml^{-1}).

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- Isolations from 13 locations across 5 counties; Bay, Huron, Saginaw, Sanilac, and Tuscola.
- 38% *Rhizoctonia*, 40% *Fusarium*, 16% *Geotrichum* and 6% *Trichoderma* isolated from samples (Fig. 2)
- *Geotrichum* causes a rubbery rot in potato, and is common in waterlogged soils. Recently, *Geotrichum* was reported causing a similar wet rot on beets in Minnesota and North Dakota (Khan et al. 2019).
- *Trichoderma* found in Bay, Saginaw and Huron counties. Not characterized on sugar beet in Michigan before, however it is prevalent in the Red River Valley. It is often used as a biological control in greenhouses.

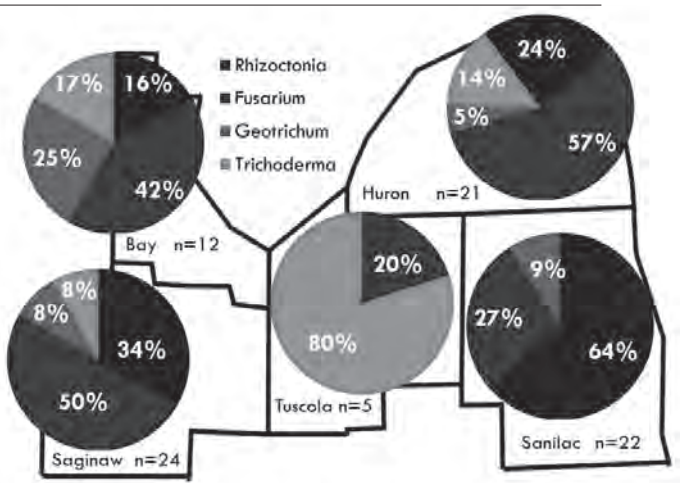

Figure 2. Frequency of root pathogens per county. Of 85 total samples, 12 from Bay, 24 from Saginaw, 5 from Tuscola, 21 from Huron and 22 from Sanilac.

Distribution of *Rhizoctonia solani* AG2-2 genotypes in the sugarbeet growing regions of the U.S. and Europe

Douglas Minier & Linda Hanson, Michigan State University and USDA-ARS

Sample collection and genotyping. We recently developed a set of molecular markers for *Rhizoctonia solani* AG2-2, the causal agent of Rhizoctonia root and crown rot in sugarbeet. These markers allow us to study the diversity and distribution of *R. solani* AG2-2 genotypes. Distribution studies provide insight into the genetic groups which can help connect cultural practices or management strategies to fungal types. As an example, seventy-eight isolates of *Rhizoctonia solani* AG2-2 were collected from the major growing regions of the United States and Europe (Fig. 1) including: Northwest (8 isolates), Central Plains (7 isolates), Red River Valley (15 isolates), Michigan (32 isolates) and Europe (16 isolates). Isolates were recovered from three host crops; sugarbeet (59 isolates), dry bean (11 isolates) and soybean (8 isolates). Genotypes were determined and individual isolates were assigned to one of four subgroups (PR, PR/A, BR, NR) (Fig. 2). AG2-2PR and AG2-2PR/A are generally more aggressive on dry beans than the other groups, while AG2-2BR is generally more aggressive on sugarbeet. AG2-2NR is generally a weaker pathogen on both of those crops.

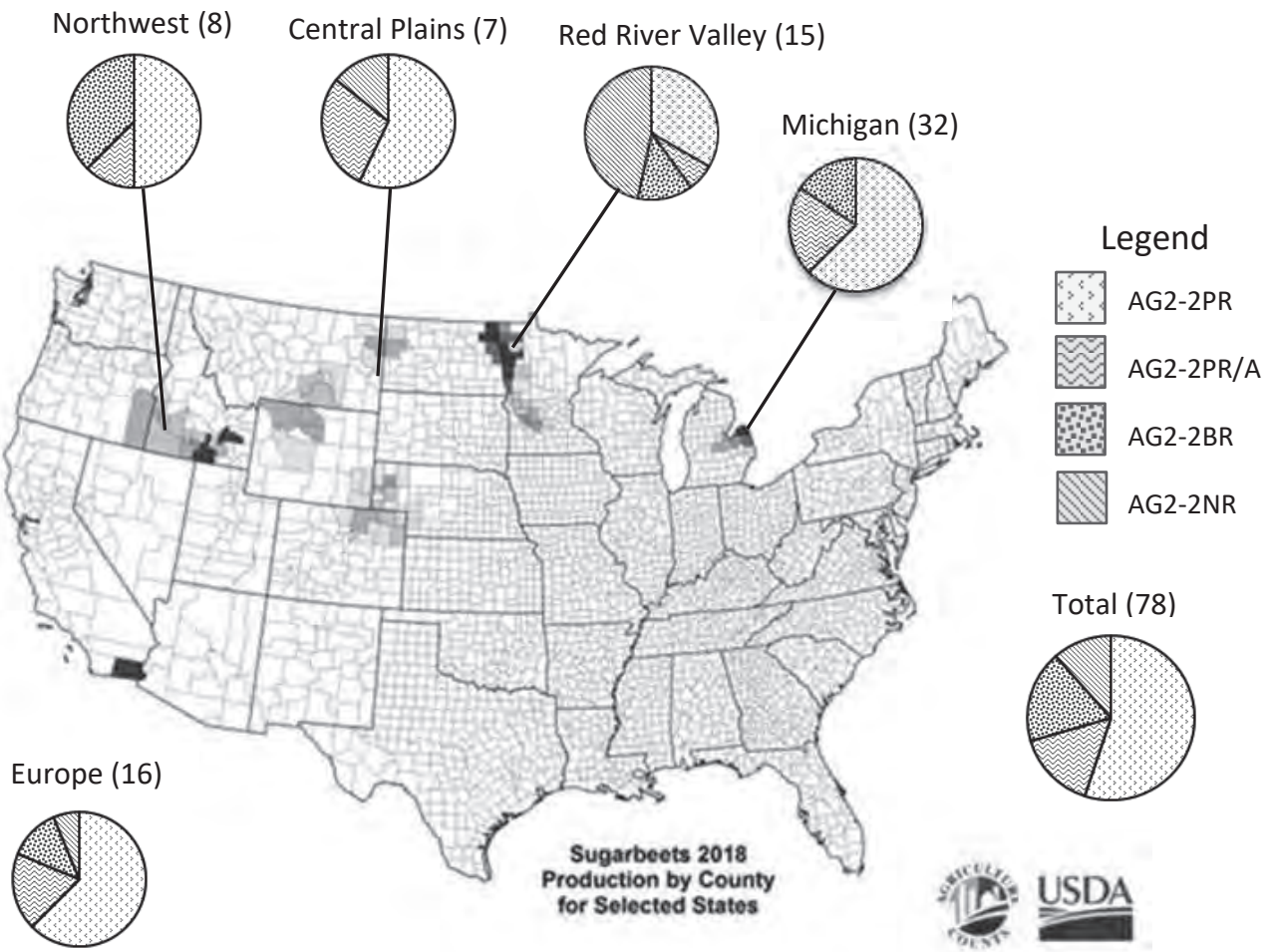

Figure 1. Distribution of *Rhizoctonia solani* AG2-2 isolates by phylogenetic group based on SSR genotypes. Pie charts show proportion of isolates in the four phylogenetic groups recovered from each growing region. Numbers in parentheses indicate total number of isolates included from each region. Map source: USDA, National Agricultural Statistics Service

Distribution of *Rhizoctonia solani* AG2-2 genotypes in the sugarbeet growing regions of the U.S. and Europe

Douglas Minier & Linda Hanson, Michigan State University and USDA-ARS

Summary of Results. AG2-2PR was the most common subgroup in all regions except the Red River Valley. Overall, about 2/3 of the isolates in this preliminary study were in subgroup AG2-2PR if AG2-2PR and AG2-2PR/A are considered to be the same group. Subgroup AG2-2NR was the least common group and there were no isolates from this group in the tested isolates from the Michigan or the Northwest regions. However, subgroup AG2-2NR was the predominant group in the Red River Valley. Europe had isolates from each of the four subgroups in contrast to previous studies that indicated they had only one cultural type.

Continuing projects that utilize this set of molecular markers include investigating the relationship between genotype and crop type and examining the diversity and population structure in Michigan fields.

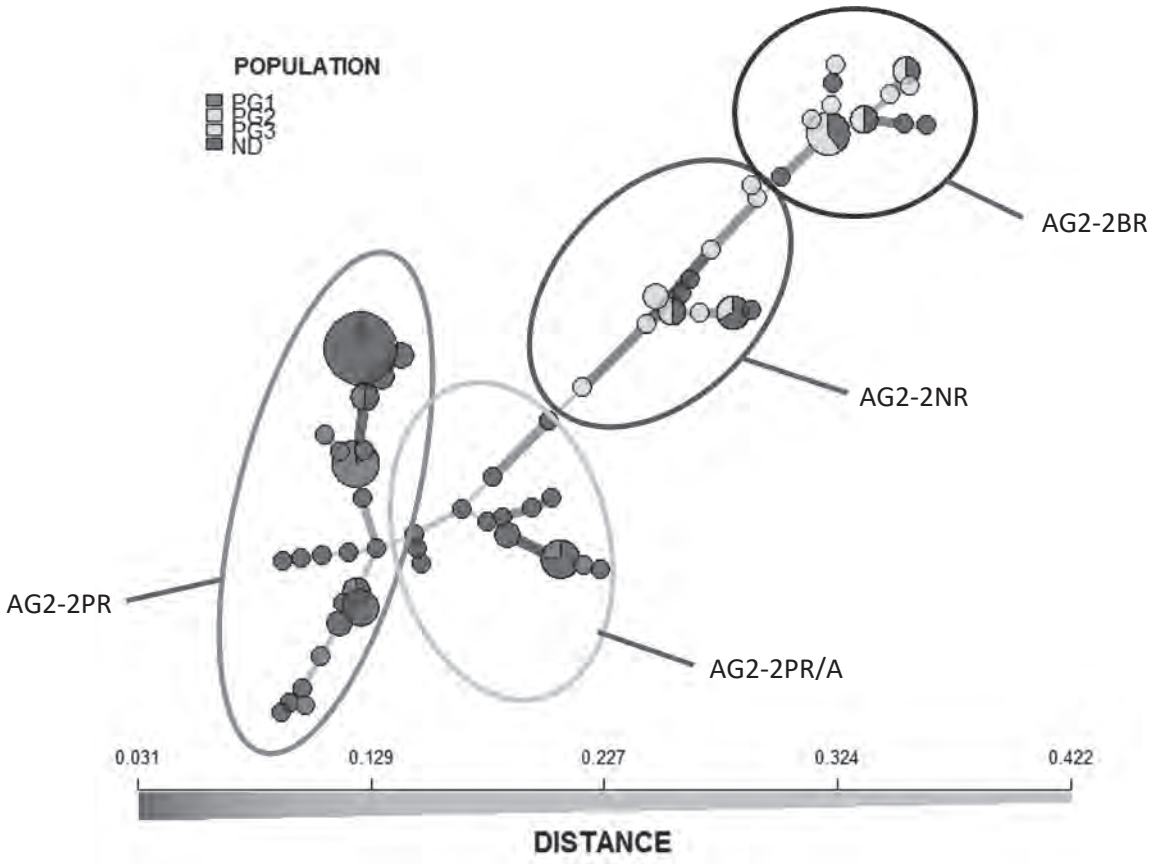

Figure 2. Minimum spanning network showing the relationship of the four genetic subgroups within *Rhizoctonia solani* AG2-2. Filled circles represent individual genotypes with the size of the circle indicating the number of isolates with the specified genotype. The lines connecting genotypes represent genetic distance with heavier, darker lines indicating closer relationships and thinner, lighter colored lines indicating more distant relationships. Large, unfilled circles are drawn around genotypes that are included in the indicated subgroup.

Xanthion In-Furrow Fungicide

Spartan Acres Farms, Freeland - 2019

Trial Quality: Very good
Variety: HIL-9865
Planted: April 26
Harv/Samp: Sept 18 / Sept 17
Plot Size: 3 reps
Row Spacing: 20 inch
Seeding Rate: 62,000

Soil Type: Loam
Fertilizer: 2x2: 42#-14#-0-10#S-2#B; 6-8 Leaf: 90# N
Prev Crop: Wheat
Weather: Wet early, dry July & August, harvested after first rain in September

Rhizoc Control: See treatments and comments
Cerc Control: Excellent control: See comments for materials
Other Pests: Aphanomyces

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft. of Row		Dead Beets / 1200 Ft
							18 Day	38 Day	
Quadris	$1,354	8126	298	27.3	20.2	94.5	161	176	53
Xanthion	$1,336	8016	294	27.2	20.2	94.0	153	177	59
Check	$1,328	7967	296	26.9	20.1	94.5	166	183	48
Average	$1,339	8036	296	27.1	20.2	94.3	160	178	53
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	2.1	2.1	1.9	1.2	1.3	0.4	6.8	3.1	25.5

Comments: This trial was done to compare Xanthion In-Furrow Fungicide (BASF) to Quadris (Syngenta) for control of Rhizoctonia. Xanthion is a 2 component fungicide made up of a biological fungicide and pyraclostrobin (active ingredient in Headline). Both Xanthion and Quadris were applied T-band in-furrow. Each product went through a Dosatron injection system to mix with water. Xanthion was applied at 10.8 oz/acre (1.8 oz of the biological fungicide, 9 oz of pyraclostrobin) with 4 oz/acre of Fastac insecticide. The Quadris treatment was 8 oz/acre of Quadris and 4 oz/acre of Fastac insecticide. The Check treatment did not receive any fungicide or insecticide. No treatments in this trial received any foliar Quadris. In this trial, the best indicator of a fungicide's performance against Rhizoctonia is the dead beet counts. The dead beet counts were relatively low, and a high percentage of what was found was due to Aphanomyces and not Rhizoctonia. This is likely the reason that there was no advantage seen with these products over the untreated check. Leafspot materials were as follows: 6/22 EBDC, 6/30 Proline + EBDC, 7/12 Agri Tin + EBDC, 7/24 Priaxor + EBDC, 8/5 Provysol + EBDC, 8/20 Badge, 8/30 Badge.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270. Does not include early delivery premium.

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

Quadris plus Adjuvants

Helmreich Farms, Freeland - 2019

Trial Quality: Very Good
Variety SX-1275N
Planted: May 15
Harv/Samp: Oct 25 / Oct 25
Plot Size: 4 reps
Row Spacing: 20 inch
Seeding Rate: 56,000

Soil Type: Loam
Fertilizer: 2x2: 40# N + MicroPack (2 Zn,2 Mn, 2 B, .5 Cu); PPI: 104# N by 28%; 6/27: 60# N by streamer
Prev Crop: Soybeans
Weather: Wet early, dry July & August, wet fall

Rhiz Control: Good control: Quadris I.F (7 oz) + 8 leaf (15.7 oz). See comments.
Cerc Control: Excellent control: See comments for materials
Other Pests: Root aphid

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Dead Beets / 1200 Ft
Quadris + Masterlock	$1,187	7120	282	25.2	18.3	97.0	47
Check	$1,176	7054	284	24.9	18.4	97.0	101
Quadris + Rainier EA	$1,171	7025	279	25.2	18.1	97.0	40
Quadris	$1,162	6969	284	24.5	18.4	97.0	47
Average	$1,174	7042	282	24.9	18.3	97.0	59
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	4.9	4.9	3.2	2.7	3.0	0.2	63.5

Comments: The efficacy of Quadris in large part depends on its ability to move into the soil and impact the disease. Therefore, the goal of this study was to determine what impact different types of adjuvants have on the mobility of Quadris and thus its efficacy. Two different adjuvants were tested, both of which were applied with Quadris at 15.7 oz/acre in a 7 inch T-band in 12 GPA of water. The first was MasterLock (2.25 oz/acre), a commonly used spreader-sticker from Winfield. Before the experiment it was hypothesized this adjuvant could have a negative impact on the efficacy of Quadris by limiting its mobility. The second was Rainier EA (11.2 oz/acre), a spreader from Wilbur-Ellis. It was originally hypothesized this adjuvant could have a positive impact on Quadris by improving its mobility. All treatments previously received Quadris in-furrow at 7 oz/acre. The best indicator in this trial of a product's performance is the dead beet count. The amount of Rhizoctonia root rot/dead beet counts observed in this trial was low, which made it difficult to see any differences between the treatments. In the dead beet count, no statistical differences were seen between treatments, but all of the Quadris applications were numerically better than the check. Keep in mind that this trial previously received in-furrow Quadris and the variety used was one of the most susceptible to Rhizoctonia that is currently planted. The overall quality of this trial was very good, with low leaf spot pressure. A relatively high level of root aphids were found in this trial, but appeared to impact the treatments evenly. Consequently, no significant differences were found for any of the metrics observed. The leafspot program was as follows: 7/1 EBDC, 7/11 Provysol + EBDC, 7/25 Priaxor + EBDC, 8/8 Minerva Duo + EBDC, 8/22 EBDC, 9/5 EBDC. All were with Reguard adjuvant.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270.

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

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets

Deshano, Auburn - 2019

Trial Quality: Fair-Good
Varieties: B - 1606N, C - 752NT, C - 675, C - RR059, and HM - 9908
Planted: April 29
Harvested: Oct 7
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches
Soil Info: Loam
% OM: 2.4 **pH**: 8.0 **CEC:** 9.2
P: Above Opt **K:** Opt
Mn: High **B:** Medium
Added N: 139 lbs.
Previous Crop: Corn
Rhizoc Level: Low
DSV Level: Very high
Problems: SB Cyst Nematode
Seeding Rate: 4.1 inches
Rainfall: 26.6 inches
Beets/100 ft: ~ 185
Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

Application Timing Effect (averaged over varieties)

No.	Treatment	Net $/A	ALS 60% : CLS 40% % Leaf Damage		Bacterial % Damage	RWSA	RWST	T/A	% SUC
			4-Oct	26-Sep	26-Sep				
2	More Aggressive	**$1,068**	**1.5**	**1.2**	**1.1**	**7682**	**267**	**28.7**	**17.0**
1	Recommended	**$1,048**	**2.9**	**2.3**	**1.0**	**7458**	**263**	**28.3**	**16.8**
3	1st and 15th	$930	**3.5**	**2.3**	**1.1**	6815	259	26.1	**16.6**
4	Less Aggressive	$860	6.6	5.5	**1.2**	6214	**263**	23.5	**16.8**
5	Untreated	$850	82.3	54.8	2.3	5256	248	21.1	16.1
Average		$951.2	19.32	13.21	1.33	6685.0	259.8	25.51	16.66
LSD 5%		82.4	2.16	2.70	0.34	509.9	6.8	1.72	0.42
CV%		13.7	17.6	28.0	41.0	12.1	4.1	10.7	4.0

Variety Effect (averaged over fungicide treatments)

No.	Treatment	Net $/A	ALS 60% : CLS 40% % Leaf Damage		Bacterial % Damage	RWSA	RWST	T/A	% SUC
			4-Oct	26-Sep	26-Sep				
3	B - 1606N	**$1,320**	**15.3**	**11.2**	**0.8**	**9007**	**269**	**33.4**	**17.2**
4	C - 752NT	$1,223	**15.4**	**10.2**	**1.1**	8403	**265**	31.7	**17.0**
2	C - 675	$875	**19.7**	17.6	1.3	6167	258	23.8	16.5
5	C - RR059	$699	23.3	20.7	1.8	5242	254	20.5	16.3
1	HIL - 9908	$639	23.0	16.4	1.6	4606	254	18.1	16.3
Average		$951.2	19.32	13.21	1.33	6685.0	259.8	25.51	16.66
LSD 5%		77.7	2.20	3.34	0.30	481.0	7.4	1.79	0.43
CV%		11.9	16.5	31.9	33.0	10.4	4.1	10.2	3.7

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets

Deshano, Auburn - 2019

No.	Treatment	Variety	# of Applic	ALS 60% : CLS 40% % Leaf Damage		Bacterial Damage	Net $/A	RWSA	RWST	T/A	% SUC
				4-Oct	26-Sep	26-Sep					
13	1st and 15th	B - 1606N	7	**1.3**	**0.6**	**0.5**	**$1,301**	**9074**	**272**	**33.4**	**17.3**
12	More Aggressive	B - 1606N	8	**1.5**	**1.3**	**0.8**	**$1,440**	**10061**	**275**	**36.6**	**17.5**
11	Recommended	B - 1606N	7	**2.0**	**1.3**	**0.5**	**$1,399**	**9679**	**269**	**36.1**	**17.2**
14	Less Aggressive	B - 1606N	6	**2.9**	**2.5**	**0.7**	$1,204	8433	**272**	31.0	**17.4**
15	Untreated	B - 1606N	0	68.8	50.3	1.7	**$1,258**	7785	257	30.2	**16.8**
17	More Aggressive	C - 752NT	8	**0.4**	**0.3**	**0.8**	$1,224	8724	**265**	**32.9**	**17.0**
16	Recommended	C - 752NT	8	**0.8**	**0.9**	**0.7**	$1,220	8576	**269**	31.9	**17.3**
18	1st and 15th	C - 752NT	7	**1.0**	**0.7**	**0.6**	**$1,286**	**8980**	**269**	**33.4**	**17.2**
19	Less Aggressive	C - 752NT	6	**2.3**	**2.0**	**0.8**	$1,242	8666	**270**	32.2	**17.3**
20	Untreated	C - 752NT	0	72.5	47.0	2.5	$1,143	7071	251	28.2	16.4
7	More Aggressive	C - 675	7	**0.8**	**0.6**	**0.8**	$1,050	7555	**271**	27.9	**17.2**
6	Recommended	C - 675	6	**2.0**	**1.5**	**0.9**	$1,024	7272	**265**	27.4	**16.9**
9	Less Aggressive	C - 675	5	**2.8**	**1.5**	**1.0**	$754	5383	**262**	20.5	**16.7**
8	1st and 15th	C - 675	7	**3.0**	**2.0**	**1.1**	$780	5884	253	23.3	16.1
10	Untreated	C - 675	0	90.0	82.5	2.7	$766	4740	239	19.8	15.4
22	More Aggressive	C - RR059	9	**1.9**	**1.5**	1.5	$880	6623	**260**	25.5	**16.6**
21	Recommended	C - RR059	9	**3.4**	**2.8**	1.6	$832	6327	254	24.9	16.2
23	1st and 15th	C - RR059	7	5.8	**4.5**	1.7	$689	5390	257	20.9	**16.5**
24	Less Aggressive	C - RR059	7	12.8	10.3	1.6	$555	4546	258	17.6	**16.5**
25	Untreated	C - RR059	0	92.5	84.5	2.7	$538	3326	241	13.8	15.6
2	More Aggressive	HIL - 9908	6	**2.9**	**2.3**	1.4	$746	5448	**263**	20.7	**16.8**
1	Recommended	HIL - 9908	5	6.2	**5.3**	1.4	$764	5435	257	21.1	**16.5**
3	1st and 15th	HIL - 9908	7	6.2	**3.8**	1.5	$597	4749	244	19.3	15.7
4	Less Aggressive	HIL - 9908	4	12.1	11.0	1.8	$547	4042	251	16.0	16.1
5	Untreated	HIL - 9908	0	87.5	59.5	1.9	$543	3357	254	13.2	16.4
Average				19.32	15.20	1.33	$951.2	6685.0	259.8	25.51	16.66
LSD 5%				4.82	6.03	0.77	184.3	1140.2	15.2	3.85	0.94
CV %				17.6	28.0	41.0	13.7	12.1	4.1	10.7	4.0

Comments: The trial was located in a good quality field in an area where Cercospora (*Cercospora beticola*) and Alternaria (*Alternaria alternata*) leafspot has been difficult to control. The sugarbeet stand was good (~185 B/100 ft) and root rots were not a problem. Sugarbeet cyst nematodes were present at levels that may have influenced trial results. The leafspot infestation was high and consisted of ALS (~60% of infestation) and CLS (~40% infestation). Leafspot levels remained high into the fall. The BEETcast treatments consisted of: 1.) Standard Recommendation; 2.) More Aggressive (closer spray intervals); 3.) Applied on the 1st and 15th; 4.) Less Aggressive (longer spray intervals) and 5.) Untreated Check. The treatments were applied to 5 different varieties: HIL - 9908 (tolerant to LS), C - 675 (partial tolerance), C - RR059 (susceptible to ALS), B - 1606N (less tolerant) and C - 752NT (less tolerant). B - 1606N and C - 752NT are nematode tolerant varieties while the other 3 varieties are susceptible to nematodes. B - 1606N and C - 752NT provided the best overall leafspot control and also had the highest sugarbeet yields and quality. C - 675 gave intermediate results while C - RR059 and HIL - 9908 had lower yields, quality and higher levels of damage from leafspot. The reason for poor performance by C - RR059 was probably due to it's suscepibility to ALS and nematodes. Sugarbeet cyst nematodes may have been a contributing factor in the poor performance of C - 675 and HIL - 9908.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora (*Cercospora beticola*) Leafspot

Parr, Brown City - 2019

Trial Quality: Good
Varieties: B - 1606N, C - 752NT, C - 675 C - RR059 and HIL - 9908
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 6 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.4 **pH**: 6.8 **CEC:** 13.8
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Previous Crop: Corn

Rhizoc Level: Low
DSV's: Very High
Problems: Low Disease
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 189

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

Application Timing Effect (averaged over varieties)

No.	Treatment	Net $/A	% Leaf Damage 16-Oct	% Leaf Damage 25-Sep	RWSA	RWST	T/A	% SUC
3	1st and 15th	**$1,930**	**0.4**	**0.3**	**11734**	**239**	**49.1**	**16.8**
1	Recommended	**$1,915**	**0.5**	**0.1**	**11579**	**240**	**48.3**	**17.0**
4	Less Aggressive	**$1,905**	**1.1**	**0.3**	**11443**	**238**	**48.2**	**16.7**
2	More Aggressive	**$1,890**	**0.4**	**0.2**	**11523**	**236**	**49.0**	**16.7**
5	Untreated	$1,748	22.7	11.2	9761	221	44.4	16.0
Average		$1,877.6	5.00	2.43	11208.0	234.8	47.79	16.63
LSD 5%		63.0	3.06	1.66	351.7	4.9	1.66	0.27
CV%		6.0	108.8	121.2	5.6	3.7	6.2	2.9

Variety Effect (averaged over fungicide treatments)

No.	Treatment	Net $/A	% Leaf Damage 16-Oct	% Leaf Damage 25-Sep	RWSA	RWST	T/A	% SUC
3	B - 1606N	**$1,936**	5.6	3.2	**11567**	230	**50.3**	16.4
4	C - 752NT	**$1,912**	5.8	3.3	**11436**	231	**49.5**	16.5
5	C - RR059	**$1,898**	5.9	2.5	**11430**	235	48.7	**16.7**
2	C - 675	$1,841	6.1	2.5	10962	233	47.0	16.6
1	HM - 9908	$1,800	**1.7**	**0.7**	10644	**245**	43.4	**17.0**
Average		$1,877.6	5.00	2.43	11208.0	234.8	47.79	16.63
LSD 5%		70.7	2.39	1.30	394.8	4.2	1.46	0.22
CV%		6.3	79.7	88.8	5.9	3.0	5.1	2.3

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets

Parr, Brown City - 2019

No.	Treatment	Variety	# of Applic	% Leaf Damage 16-Oct	% Leaf Damage 25-Sep	Net $/A	RWSA	RWST	T/A	% SUC
12	More Aggressive	B - 1606N	8	**0.3**	**0.1**	$1,920	**11762**	232	**50.8**	16.4
13	1st and 15th	B - 1606N	7	**0.5**	**0.3**	**$2,070**	**12487**	235	**53.1**	16.6
11	Recommended	B - 1606N	7	**0.6**	**0.1**	**$1,991**	**12045**	239	**50.4**	**17.0**
14	Less Aggressive	B - 1606N	6	**1.2**	**0.4**	**$1,947**	**11759**	230	**51.1**	16.3
15	Untreated	B - 1606N	0	25.2	15.0	$1,752	9784	212	46.3	15.6
17	More Aggressive	C - 752NT	8	**0.3**	**0.3**	**$1,980**	**12094**	238	**50.9**	**16.9**
18	1st and 15th	C - 752NT	7	**0.3**	**0.3**	$1,878	11414	232	**49.4**	16.5
16	Recommended	C - 752NT	8	**0.5**	**0.1**	$1,922	11663	235	**49.7**	16.8
19	Less Aggressive	C - 752NT	6	**1.0**	**0.4**	**$1,986**	**11979**	230	**51.9**	16.2
20	Untreated	C - 752NT	0	26.8	15.4	$1,796	10028	222	45.4	16.1
8	1st and 15th	C - 675	7	**0.4**	**0.3**	$1,913	11639	240	48.5	16.8
6	Recommended	C - 675	6	**0.5**	**0.1**	$1,867	11270	232	48.6	16.4
7	More Aggressive	C - 675	7	**0.5**	**0.2**	$1,864	11367	234	48.6	16.6
9	Less Aggressive	C - 675	5	**1.2**	**0.3**	$1,866	11070	238	46.6	16.8
10	Untreated	C - 675	0	27.6	11.6	$1,695	9465	222	42.8	16.3
23	1st and 15th	C - RR059	7	**0.3**	**0.2**	**$1,957**	**11946**	242	49.3	**17.1**
21	Recommended	C - RR059	9	**0.5**	**0.2**	$1,918	**11776**	240	49.0	**17.2**
22	More Aggressive	C - RR059	9	**0.5**	**0.2**	$1,866	11488	232	**49.6**	16.4
24	Less Aggressive	C - RR059	7	**1.1**	**0.3**	**$1,940**	**11838**	**243**	48.7	**17.1**
25	Untreated	C - RR059	0	27.0	11.6	$1,809	10101	215	47.0	15.9
3	1st and 15th	HIL - 9908	7	**0.2**	**0.2**	$1,831	11182	**248**	45.2	**17.2**
2	More Aggressive	HIL - 9908	6	**0.3**	**0.3**	$1,818	10905	**243**	45.1	**17.0**
1	Recommended	HIL - 9908	5	**0.3**	**0.1**	$1,879	11139	**254**	43.9	**17.5**
4	Less Aggressive	HIL - 9908	4	**0.9**	**0.2**	$1,786	10567	**248**	42.6	**16.9**
5	Untreated	HIL - 9908	0	**7.0**	**2.6**	$1,688	9426	234	40.4	16.3
Average				5.00	2.43	$1,877.51	11207.7	234.8	47.79	16.64
LSD 5%				6.85	3.71	140.8	786.4	10.9	3.70	0.60
CV %				108.8	121.2	6.0	5.6	3.7	6.2	2.9

Comments: The trial was located in a high yielding, good quality field in an area where leafspot control has been difficult. The sugarbeet stand was favorable (~ 190 B/100 ft) and root rots were not an issue. Alternaria leafspot was not a problem. The only problem was that the leafspot infestation came late and did not reach a high level. The BEETcast treatments were: 1.) Standard BEETcast Recommendation; 2.) More Aggressive (closer spray intervals); 3.) Applied on the 1st and 15th; 4.) Less Aggressive and 5.) Untreated Check. Treatments were applied to 5 varieties: HIL - 9908 (tolerant); C - 675 (partial tolerance); C - RR059 (less tolerant); C - 752NT (less tolerant) and B - 1606N (less tolerant). With respect to CLS control, the treatments ranked (best to worst): More Aggressive = 1st / 15th = Recommended > Less Aggressive > Untreated. HIL - 9908 provided the best CLS control followed by B - 1606N = C - 752NT = C - RR059 = C 675. Grower income ranked (highest to lowest): B - 1606N > C - 752 NT > C - RR059 > C - 675 > HIL - 9908.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets
Deshano, Auburn & Parr, Brown City - 2019

No.	Program	Treatment	App	Deshano		Parr	
				Date	DSV	Date	DSV
1	Recommended HIL-9908	EBDC* + MasterLock	1	3-Jul	54	1-Jul	62
		Proline + EBDC* + NIS** + MasterLock	2	9-Jul	66	10-Jul	84
		Super Tin + Topsin + EBDC* + MasterLock	3	28-Jul	99	28-Jul	119
		Inspire XT + EBDC* + MasterLock	4	14-Aug	126	15-Aug	143
		Super Tin + EBDC* + MasterLock	5	4-Sep	163	2-Sep	172
2	More Aggressive HIL-9908	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	23-Jul	86	22-Jul	111
		Inspire XT + EBDC* + MasterLock	4	17-Aug	134	8-Aug	136
		Super Tin + EBDC* + MasterLock	5	23-Aug	146	22-Aug	160
		EBDC* + Copper* + MasterLock	6	12-Sep	175	9-Sep	178
3	1st and 15th HIL-9908	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	15-Aug	143
		EBDC* + Copper* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + Copper* + MasterLock	7	16-Sep	180	16-Sep	199
4	Less Aggressive HIL-9908	Proline + EBDC* + NIS** + MasterLock	1	9-Jul	66	10-Jul	84
		Super Tin + Topsin + EBDC* + MasterLock	2	31-Jul	105	1-Aug	126
		Inspire XT + EBDC* + MasterLock	3	20-Aug	140	22-Aug	160
		Super Tin + EBDC* + MasterLock	4	12-Sep	175	11-Sep	184
5	Untreated Check - HIL-9908						
6	Recommended C-675	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	13-Jul	70	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	23-Jul	86	22-Jul	111
		Inspire XT + EBDC* + MasterLock	4	6-Aug	114	5-Aug	130
		Super Tin + EBDC* + MasterLock	5	23-Aug	146	21-Aug	158
		Priaxor + Copper* + MasterLock	6	8-Sep	166	4-Sep	175
7	More Aggressive C-675	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	18-Jul	78	17-Jul	99
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	13-Aug	143
		Priaxor + EBDC* + MasterLock	6	26-Aug	149	28-Aug	168
		EBDC* + Copper* + MasterLock	7	12-Sep	175	11-Sep	184
8	1st and 15th C-675	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	15-Aug	143
		EBDC* + Copper* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + EBDC* + MasterLock	7	16-Sep	180	16-Sep	199

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

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Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets

Deshano, Auburn & Parr, Brown City - 2019

No.	Program	Treatment	App	Deshano		Parr	
				Date	DSV	Date	DSV
9	Less Aggressive C-675	Proline + EBDC* + NIS** + MasterLock	1	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	2	23-Jul	86	22-Jul	111
		Inspire XT + EBDC* + MasterLock	3	6-Aug	114	5-Aug	130
		Super Tin + EBDC* + MasterLock	4	26-Aug	149	22-Aug	162
		EBDC* + MasterLock	5	12-Sep	175	11-Sep	184
10	Untreated Check - C-675						
11	Recommended B-1606N	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + MasterLock	2	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	18-Jul	78	18-Jul	101
		Inspire XT + EBDC* + MasterLock	4	5-Aug	112	5-Aug	130
		Super Tin + EBDC* + MasterLock	5	19-Aug	138	19-Aug	153
		EBDC* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + Copper* + MasterLock	7	12-Sep	175	11-Sep	184
12	More Aggressive B-1606N	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	28-Jul	99	29-Jul	121
		Super Tin + EBDC* + MasterLock	5	12-Aug	124	12-Aug	141
		EBDC* + Copper* + MasterLock	6	23-Aug	146	22-Aug	160
		Priaxor + Copper* + MasterLock	7	30-Aug	157	29-Aug	168
		EBDC* + Copper* + MasterLock	8	12-Sep	175	9-Sep	178
13	1st and 15th B-1606N	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	15-Aug	143
		EBDC* + Copper* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + Copper* + MasterLock	7	16-Sep	175	16-Sep	199
14	Less Aggressive B-1606N	Proline + EBDC* + NIS** + MasterLock	1	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	2	18-Jul	78	18-Jul	101
		Inspire XT + EBDC* + MasterLock	3	2-Aug	107	1-Aug	126
		Super Tin + EBDC* + MasterLock	4	19-Aug	138	19-Aug	153
		Priaxor + Copper* + MasterLock	5	4-Sep	163	4-Sep	175
		EBDC* + MasterLock	6	16-Sep	175	13-Sep	190
15	Untreated Check - B-1606N						
16	Recommended C-752NT	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	18-Jul	78	18-Jul	101
		Inspire XT + EBDC* + MasterLock	4	2-Aug	107	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	16-Aug	130	15-Aug	143
		EBDC* + Copper* + MasterLock	6	26-Aug	149	28-Aug	168
		Priaxor + Copper* + MasterLock	7	4-Sep	163	4-Sep	175
		Copper* + MasterLock	8	16-Sep	175	16-Sep	199

*** EBDC = Manzate / Copper = Badge** **NIS = Preference**

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets
Deshano, Auburn & Parr, Brown City - 2019

No.	Program	Treatment	App	Deshano		Parr	
				Date	DSV	Date	DSV
17	More Aggressive C-752NT	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	12-Jul	69	11-Jul	87
		Inspire XT + EBDC* + MasterLock	4	25-Jul	90	25-Jul	115
		Super Tin + EBDC* + MasterLock	5	6-Aug	114	5-Aug	130
		EBDC* + Copper* + MasterLock	6	19-Aug	138	19-Aug	153
		Priaxor + Copper* + MasterLock	7	26-Aug	149	28-Aug	168
		Copper* + MasterLock	8	12-Sep	175	9-Sep	178
18	1st and 15th C-752NT	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	15-Aug	143
		EBDC* + Copper* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + Copper* + MasterLock	7	16-Sep	180	16-Sep	199
19	Less Aggressive C-752NT	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	18-Jul	78	18-Jul	101
		Inspire XT + EBDC* + MasterLock	4	5-Aug	112	5-Aug	130
		Super Tin + EBDC* + MasterLock	5	20-Aug	140	21-Aug	158
		EBDC* + Copper* + MasterLock	6	8-Sep	166	4-Sep	175
20	Untreated Check - C-752NT						
21	Recommended C-RR059	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	8-Jul	80
		Super Tin + Topsin + EBDC* + MasterLock	3	18-Jul	78	17-Jul	99
		Inspire XT + EBDC* + MasterLock	4	28-Jul	99	29-Jul	121
		Super Tin + EBDC* + MasterLock	5	7-Aug	117	8-Aug	136
		EBDC* + Copper* + MasterLock	6	23-Aug	146	21-Aug	158
		Priaxor + Copper* + MasterLock	7	26-Aug	149	28-Aug	168
		Copper* + MasterLock	8	12-Sep	175	9-Sep	178
		Copper* + MasterLock	9	16-Sep	180	16-Sep	199
22	More Aggressive C-RR059	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
		Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	12-Jul	69	11-Jul	87
		Inspire XT + EBDC* + MasterLock	4	25-Jul	90	25-Jul	115
		Super Tin + EBDC* + MasterLock	5	6-Aug	114	5-Aug	130
		EBDC* + Copper* + MasterLock	6	19-Aug	138	19-Aug	153
		Priaxor + Copper* + MasterLock	7	26-Aug	149	28-Aug	168
		Copper* + MasterLock	8	8-Sep	166	6-Sep	175
		Copper* + MasterLock	9	16-Sep	180	14-Sep	194

*** EBDC = Manzate / Copper = Badge**

****NIS = Preference**

Evaluate Fungicide Application Timings (BEETcast) for Control of Cercospora and Alternaria Leafspot in Sugarbeets
Deshano, Auburn & Parr, Brown City - 2019

No.	Program	Treatment	App	Deshano		Parr	
				Date	DSV	Date	DSV
23	1st and 15th	EBDC* + MasterLock	1	25-Jun	36	27-Jun	53
	C-RR059	Proline + EBDC* + NIS** + MasterLock	2	3-Jul	54	3-Jul	68
		Super Tin + Topsin + EBDC* + MasterLock	3	16-Jul	74	15-Jul	92
		Inspire XT + EBDC* + MasterLock	4	31-Jul	105	1-Aug	126
		Super Tin + EBDC* + MasterLock	5	14-Aug	126	15-Aug	143
		EBDC* + Copper* + MasterLock	6	4-Sep	163	4-Sep	175
		Priaxor + Copper* + MasterLock	7	16-Sep	180	16-Sep	199
24	Less Aggressive	Proline + EBDC* + NIS** + MasterLock	1	3-Jul	54	1-Jul	62
	C-RR059	Super Tin + Topsin + EBDC* + MasterLock	2	12-Jul	69	11-Jul	87
		Inspire XT + EBDC* + MasterLock	3	25-Jul	90	25-Jul	115
		Super Tin + EBDC* + MasterLock	4	6-Aug	114	5-Aug	132
		Priaxor + Copper* + MasterLock	5	19-Aug	138	19-Aug	153
		EBDC* + Copper* + MasterLock	6	30-Aug	157	29-Aug	168
		EBDC* + MasterLock	7	13-Sep	175	11-Sep	184
25	Untreated Check - C-RR059						

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City - 2019

Trial Quality: Good
Variety: C - RR059
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.4 **pH:** 6.8 **CEC:** 13.8
P: Above opt **K:** Above opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Corn

Rhizoc Level: Low
DSV Level: Very High
Problems: Low CLS level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~201

Application: JD 3520 Tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment***	Applic Timing	% Leaf Damage		Net $/A	RWSA	RWST	T/A	% Suc
			24-Oct	5-Sep					
14	Super Tin + Topsin + EBDC*	1 3	**0.5**	**0.1**	**$2,122**	**11803**	**241**	**49.0**	**17.1**
	Copper* + EBDC*	2 5							
	Proline + NIS** + EBDC*	4							
12	Quadris + EBDC*	1 3	**0.6**	**0.1**	$1,893	10668	**232**	46.0	**16.6**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
28	EBDC*	1 2 3 4 5 6 7	**0.6**	**0.1**	**$2,118**	**11540**	**234**	**49.6**	**16.7**
5	Enable + NIS** + EBDC*	1 3	**0.8**	**0.1**	**$1,948**	**10964**	**238**	46.1	**16.9**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
17	Propulse + EBDC*	1 3	**1.0**	**0.1**	**$1,964**	**11205**	**229**	**49.0**	**16.4**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
22	Topguard + EBDC*	1 3	**1.0**	**0.1**	**$2,068**	**11503**	**239**	**47.9**	**16.9**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
16	Minerva Duo + EBDC*	1 3	**1.1**	**0.1**	**$1,978**	**11088**	**228**	**48.6**	**16.5**
	Badge + EBDC*	2 5							
	Proline + Preference + EBDC*	4							
27	Proline + NIS** + Copper* + EBDC*	1 3	**1.1**	**0.1**	$1,903	**10958**	**234**	**46.8**	**16.6**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
18	Delaro + Proline + EBDC*	1 3	**1.1**	**0.1**	**$2,027**	**11439**	**231**	**49.6**	16.2
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
21	Dexter Max	1 3	**1.2**	**0.1**	**$2,053**	**11387**	**237**	**48.0**	**16.9**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
10	Flint Extra + EBDC*	1 3	**1.2**	**0.1**	$1,829	10438	223	**46.9**	16.1
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
8	Provysol + EBDC*	1 3	**1.4**	**0.1**	**$1,944**	**10899**	**233**	**46.8**	**16.5**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
19	Quadris + Inspire (not XT) + EBDC*	1 3	**1.6**	**0.1**	**$1,961**	**11117**	**229**	**48.7**	**16.4**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							

*** EBDC = Manzate / Copper = Badge**
**** NIS = Preference**
*****All treatments included MasterLock @ 6.4 fl oz**
Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City - 2019

No.	Treatment***	Applic Timing	% Leaf Damage		Net $/A	RWSA	RWST	T/A	% Suc
			24-Oct	5-Sep					
25	Proline + Inspire + NIS** + EBDC*	1 3	**1.6**	**0.1**	**$1,982**	**11225**	224	**50.2**	16.2
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
2	Inspire XT + EBDC*	1 3	**1.6**	**0.1**	**$2,044**	**11443**	**246**	46.4	**17.4**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
32	Echo	1 2 3 4 5 6	**1.8**	**0.1**	**$2,006**	**11194**	226	**49.6**	16.2
11	Priaxor + EBDC*	1 3	**1.8**	**0.1**	**$2,029**	**11529**	**233**	**49.5**	**16.6**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
15	Super Tin + Topsin + EBDC*	1 3	**1.8**	**0.1**	**$2,000**	**11123**	**238**	46.7	**17.0**
	Copper* + EBDC*	2							
	Proline + NIS** + EBDC*	4							
	Copper* + EBDC*	5							
13	Super Tin + EBDC*	1 3	**1.9**	**0.1**	**$1,978**	**10962**	**230**	**47.8**	**16.5**
	Copper* + EBDC*	2							
	Proline + NIS** + EBDC*	4							
	Copper* + EBDC*	5							
7	Eminent + EBDC*	1 3	**1.9**	**0.1**	**$1,974**	**10957**	227	**48.4**	**16.4**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
24	Priaxor	1 3	**2.3**	**0.1**	$1,854	10518	224	**47.1**	16.1
	Super Tin	2							
	Copper* + EBDC*	4 5 6							
6	Minerva + EBDC*	1 3	**2.3**	**0.1**	**$2,005**	**11129**	**235**	**47.5**	**16.6**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
3	Proline + NIS** + EBDC*	1 3	**2.3**	**0.1**	**$2,019**	**11260**	226	**49.8**	16.1
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
4	Topguard + EBDC*	1 3	**2.3**	**0.3**	**$2,050**	**11348**	**246**	46.2	**17.1**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
26	Pyraziflumid + NIS** + EBDC*	1 3	**2.3**	**0.1**	**$1,981**	**11099**	**231**	**48.2**	**16.5**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
31	Copper* + EBDC*	1 2 3 4 5 6 7	**2.4**	**0.1**	$1,923	**10956**	223	**49.3**	16.0
23	Inspire XT	1 3	2.5	**0.1**	**$2,061**	**11288**	**235**	**48.2**	**16.7**
	Super Tin	2							
	Copper* + EBDC*	4 5							
35	Copper* (3 pt)	1 2 3 4 5 6 7	2.8	**0.3**	$1,932	**10817**	**229**	**47.3**	**16.4**

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

*****All treatments included MasterLock @ 6.4 fl oz**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City - 2019

No.	Treatment***	Applic Timing	% Leaf Damage		Net $/A	RWSA	RWST	T/A	% Suc
			24-Oct	5-Sep					
33	Inspire XT + Sodium Bicarb (5 lb) + EBDC*	1 3	2.8	**0.1**	**$2,046**	**11343**	**233**	**48.7**	**16.7**
	Super Tin + Sodium Bicarb (5 lb) + EBDC*	2							
	Copper* + Sodium Bicarb (5lb) + EBDC*	4 5							
20	Lucento + EBDC*	1 3	2.9	**0.1**	**$1,981**	**11058**	226	**49.1**	16.3
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5							
30	Cuprofix	1 2 3 4 5 6 7	3.1	**0.1**	**$2,055**	**11355**	**240**	**47.2**	**16.9**
29	Copper* (2 pt)	1 2 3 4 5 6 7	3.4	**0.1**	$1,910	10594	225	**47.2**	16.1
34	Inspire XT + Sodium Bicarb (2.5 lb) + EBDC*	1 3	3.5	**0.1**	**$2,137**	**11839**	**242**	**49.0**	**17.0**
	Super Tin + Sodium Bicarb (2.5 lb) + EBDC*	2							
	Copper* + Sodium Bicarb (2.5 lb) + EBDC*	4 5							
9	Headline + EBDC*	1 3	3.8	**0.1**	**$1,964**	**11163**	**232**	**48.2**	**16.5**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
1	Untreated Check		18.3	1.5	$1,786	9201	216	42.6	15.7
	Average		2.34	0.12	$1,986.3	11097.4	231.8	47.92	16.53
	LSD 5%		1.9	0.2	198.9	1024.5	17.9	3.37	0.95
	CV %		59.4	124.4	7.1	6.6	5.5	5.0	4.1

*** EBDC = Manzate / Copper = Badge**
**** NIS = Preference**
*****All treatments included MasterLock @ 6.4 fl oz**

Comments: The trial was located in a good quality, high yielding field. The potential for disease (DSV's) was high but the disease level in the trial was low to moderate. There were no outside influences such as root rots or stand problems that influenced results. This was a large trial (35 treatments) comparing most of the registered fungicides for leafspot control in sugarbeets. Leafspot control was very good in general and the disease level was too low to separate many treatments. Super Tin, Triazole, Strobilurin and EBDC based treatments all performed well. Coppers were somewhat less effective than EBDC's. Echo provided good leafspot control. The addition of sodium bicarbonate to other treatments did not appear to improve leafspot control. None of the treatments caused phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Deshano, Auburn - 2019

Trial Quality: Good
Variety: C - G333NT
Planted: April 29
Harvested: Oct 7
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 2.9 **pH:** 7.9 **CEC:** 12.1
P: Above opt **K:** Opt
Mn: High **B:** Medium
Added N: 139 lbs.
Prev Crop: Corn

Rhizoc Level: Low
DSV Level: High
Problems: None
Seeding Rate: 4.1 inches
Rainfall: 26.64 inches
Beets/100 ft: ~185

Application: JD 3520 Tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment***	Applic Timing	% Leafspot Damage		Net $/A	RWSA	RWST	T/A	% Suc
			4-Oct	23-Sep					
14	Super Tin + Topsin (20 oz) + EBDC*	1 3	**0.7**	**0.2**	$1,145	**7656**	256	**29.9**	16.6
	Copper* + EBDC*	2							
	Proline + NIS** + EBDC*	4							
	Copper* + EBDC*	5 6							
	Copper*	7							
15	Super Tin + Topsin (10 oz) + EBDC*	1 3	**0.9**	**0.5**	**$1,191**	**7863**	**265**	**29.6**	**17.3**
	Copper* + EBDC*	2							
	Proline + NIS** + EBDC*	4							
	Copper* + EBDC*	5 6							
	Copper*	7							
32	Echo	1 2 3 4 5 6	**1.5**	**1.1**	**$1,178**	**7837**	**266**	**29.5**	**17.3**
17	Propulse + EBDC*	1 3	**1.8**	**0.9**	**$1,184**	**8126**	**266**	**30.5**	**17.3**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
10	Flint Extra + EBDC*	1 3	**2.1**	**1.2**	**$1,171**	**7967**	259	**30.8**	**16.8**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
27	Proline + NIS** + Copper + EBDC*	1 3	**2.3**	**1.6**	$1,130	**7662**	**264**	**29.0**	**17.1**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
21	Dexter Max	1 3	**2.3**	**2.0**	$1,138	7544	258	**29.3**	16.7
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
19	Quadris + Inspire (not XT) + EBDC*	1 3	**2.5**	**1.8**	**$1,191**	**8086**	**267**	**30.2**	**17.2**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
9	Headline + EBDC*	1 3	**2.5**	**0.9**	$1,082	7487	255	**29.4**	16.6
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
18	Delaro + Proline + EBDC*	1 3	**2.6**	**1.4**	**$1,214**	**8199**	**274**	**29.9**	**17.6**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
28	EBDC*	1 2 3 4 5 6 7	**2.8**	**1.6**	**$1,210**	**7763**	**261**	**29.7**	**16.9**

*** EBDC = Manzate / Copper = Badge**
**** NIS = Preference**
*****All treatments included MasterLock @ 6.4 fl oz**
Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Deshano, Auburn - 2019

No.	Treatment***	Applic Timing	% Leafspot Damage		Net $/A	RWSA	RWST	T/A	% Suc
			24-Oct	5-Sep					
30	Cuprofix	1 2 3 4 5 6 7	**2.9**	**1.8**	**$1,269**	**8260**	**269**	**30.8**	**17.4**
25	Proline + Inspire XT + NIS** + EBDC*	1 3	**3.0**	**2.0**	$1,157	**7888**	**262**	**30.1**	**17.0**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
13	Super Tin + EBDC*	1 3	**3.3**	**2.0**	**$1,283**	**8347**	**271**	**30.8**	**17.4**
	Copper* + EBDC*	2 5 6							
	Proline + NIS** + EBDC*	4							
	Copper*	7							
6	Minerva + EBDC*	1 3	**3.3**	**1.9**	**$1,162**	**7675**	**262**	**29.2**	**17.0**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
11	Priaxor + EBDC*	1 3	**3.6**	**2.4**	$1,135	**7832**	257	**30.5**	**16.8**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
31	Copper* + EBDC*	1 2 3 4 5 6 7	**3.8**	**3.4**	**$1,173**	**8023**	**261**	**30.7**	**17.0**
26	Pyraziflumid + NIS** + EBDC*	1 3	**3.9**	**2.3**	**$1,227**	**8156**	**267**	**30.6**	**17.3**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
5	Enable + NIS** + EBDC*	1 3	**4.0**	**2.0**	$1,113	7534	**264**	28.5	**17.2**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
35	Copper* (3 pt)	1 2 3 4 5 6 7	**4.3**	**2.5**	$1,072	7226	255	28.4	16.5
29	Copper* (2 pt)	1 2 3 4 5 6 7	**4.4**	4.3	$1,143	7507	260	**28.9**	**16.9**
3	Proline + NIS** + EBDC*	1 3	4.5	**2.9**	$1,118	7484	**261**	28.7	**16.9**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
34	Inspire XT + Sodium Bicarb (5 lb) + EBDC*	1 3	4.9	**2.8**	**$1,201**	**7934**	257	**30.9**	16.6
	Super Tin + Sodium Bicarb (5 lb) + EBDC*	2							
	Copper* + Sodium Bicarb (5 lb) + EBDC*	4 5 6							
22	Topquard + EBDC*	1 3	5.0	**2.6**	**$1,233**	**8145**	**262**	**31.1**	**17.1**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
16	Minerva Duo + EBDC*	1 3	5.0	**3.4**	$1,132	7608	**262**	**29.1**	**16.9**
	Copper* + EBDC*	2 5 6							
	Proline + NIS** + EBDC*	4							
2	Inspire XT + EBDC*	1 3	5.0	**2.4**	**$1,232**	**8208**	**267**	**30.8**	**17.2**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

*****All treatments included MasterLock @ 6.4 fl oz**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Deshano, Auburn - 2019

No.	Treatment***	Applic Timing	% Leafspot Damage		Net $/A	RWSA	RWST	T/A	% Suc
			24-Oct	5-Sep					
7	Eminent + EBDC*	1 3	5.3	**2.9**	**$1,239**	**8110**	260	**31.2**	**16.9**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
24	Priaxor (no EBDC tankmix)	1 3	5.4	4.8	$1,080	7389	250	**29.6**	16.2
	Super Tin	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
4	Topguard + EBDC*	1 3	5.8	**3.6**	**$1,177**	**7746**	**264**	**29.4**	**17.2**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
8	Provysol + EBDC*	1 3	6.3	4.3	**$1,190**	**7927**	**269**	**29.5**	**17.5**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
33	Inspire XT + Sodium Bicarb (2.5 lb) + EBDC*	1 3	7.6	4.3	**$1,231**	**8079**	**267**	**30.3**	**17.2**
	Super Tin + Sodium Bicard (2.5 lb) + EBDC*	2							
	Copper* + Sodium Bicarb (2.5 lb) + EBDC*	4 5 6							
20	Lucento + EBDC*	1 3	8.8	4.8	**$1,166**	**7755**	258	**30.1**	16.7
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
12	Quadris + EBDC	1 3	9.0	5.3	$1,141	**7687**	**267**	28.8	**17.3**
	Super Tin + EBDC*	2							
	Copper* + EBDC*	4 5 6							
	Copper*	7							
23	Inspire XT (no EBDC tankmix)	1 3	11.0	6.8	$1,138	7386	**263**	28.1	**17.2**
	Super Tin	2							
	Copper* + EBDC*	4 5 6							
1	Untreated Check		86.8	59.5	$1,036	6033	249	24.2	16.4

Average	6.52	4.21	$1,168.0	7775.1	262.1	29.66	17.00
LSD 5%	3.7	3.4	124.7	726.5	13.0	2.33	0.80
CV %	40.8	56.9	7.6	6.7	3.5	5.6	3.3

*** EBDC = Manzate / Copper = Badge**
**** NIS = Preference**
*****All treatments included MasterLock @ 6.4 fl oz**

Comments: The trial was located in a good quality field and sugarbeet emergence was good. There were no outside factors such as root rots which influenced trial results. Leafspot infestations levels were high and consisted of CLS and ALS, with the predominant disease being CLS. This was a large trial (35 treatments) comparing most of the available fungicides for controlling leafspot diseases. Super Tin + Topsin treatments provided very good leafspot control, better than Super Tin without Topsin. The rate for Topsin did not appear to matter. Some Triazole and Strobilurin treatments and Echo also gave good results. Manzate Max and Cuprofix (7 App) were nearly as good as the better Triazole and Strobi treatments. Inspire XT and Priaxor applied without a Manzate tank mix were significantly less effective. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

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Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City & Deshano, Auburn - 2019

No.	Treatment***	App	Deshano	Parr
1	Untreated Check			
2	Inspire XT (7 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/24, 9/9
3	Proline (5.7 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
4	Topguard (14 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
5	Enable (8 oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/14, 8/23, 9/4	8/21, 8/29, 9/9
6	Minerva (13 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
7	Eminent VP (13 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
8	Provysol (5 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
9	Headline (12 fl oz) +EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6, 7	8/14, 8/23, 9/4, 9/13	8/21, 8/29, 9/9
10	Flint Extra (3.6 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6, 7	8/14, 8/23, 9/4, 9/13	8/21, 8/29, 9/9
11	Priaxor (8 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6, 7	8/14, 8/23, 9/4, 9/13	8/21, 8/29, 9/9
12	Quadris (15.5 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6, 7	8/14, 8/23, 9/4, 9/13	8/21, 8/29, 9/9
13	Super Tin (8 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/26	7/10, 8/7
	Copper* (2 pt) + EBDC* (1.6 qt)	2	7/16	7/24
	Proline (5.7 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	4	8/5	8/21
	Copper* (2 pt) + EBDC* (1.6 qt)	5, 6	8/23, 9/4	9/9
	Copper* (2 pt)	7	9/13	
14	Super Tin (8 fl oz) + Topsin (20 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/26	7/10, 8/7
	Badge (2 pt) + EBDC* (1.6 qt)	2	7/16	7/24
	Proline (5.7 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	4	8/5	8/21
	Copper* (2 pt) + EBDC* (1.6 qt)	5, 6	8/23, 9/4	9/9
	Copper* (2 pt)	7	9/13	

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

*****All treatments included MasterLock @ 6.4 fl oz**

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City & Deshano, Auburn - 2019

No.	Treatment***	App	Deshano	Parr
15	Super Tin (8 fl oz) + Topsin (10 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/26	7/10, 8/7
	Copper* (2 pt) + EBDC* (1.6 qt)	2	7/16	7/24
	Proline (5.7 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	4	8/5	8/21
	Copper* (2 pt) + EBDC* (1.6 qt)	5, 6	8/23, 9/4	9/9
	Copper* (2 pt)	7	9/13	
16	Minerva Duo (16 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/2	7/10, 8/7
	Copper* (2 pt) + EBDC* (1.6 qt)	2	7/23	7/29
	Proline (5.7 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	4	8/20	8/22
	Copper* (2 pt) + EBDC* (1.6 qt)	5	9/8	9/9
17	Propulse (13.6 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
18	Delaro (11 fl oz) + Proline (1.6 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
19	Inspire not XT (4 fl oz) + Quadris (12 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/14, 8/23, 9/4	8/21, 8/29, 9/9
	Copper* (2pt)	7	9/13	
20	Lucento (5.5 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
21	Dexter Max (2.1 lb)	1, 3	7/3, 7/26	7/10, 8/1
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/12	7/18
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/5, 8/16, 8/30	8/16, 8/28, 9/13
	Copper* (2 pt)	7	9/12	
22	Topguard EQ (7 fl oz) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
23	Inspire XT (7 fl oz)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
24	Priaxor (8 fl oz)	1, 3	7/3, 7/31	7/10, 8/7
	Super Tin (8 fl oz)	2	7/16	7/24
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/14, 8/23, 9/4	8/21, 8/29, 9/11
	Copper* (2 pt)	7	9/13	
25	Proline (5.7 fl oz) + NIS** (.125 % v/v) + Copper* (2 pt)	1, 3	7/3, 8/6	7/10, 8/12
	+ EBDC* (1.6 qt)			
	Super Tin (8fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
26	Pyraziflumid (3.1 fl oz) + NIS** (.125 % v/v) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

*****All treatments included MasterLock @ 6.4 fl oz**

Control of Cercospora (*Cercospora beticola*) in Sugarbeets with Fungicides

Parr, Brown City & Deshano, Auburn - 2019

No.	Treatment***	App	Deshano	Parr
27	Proline (5.7 fl oz) + NIS** (.125 % v/v) + Copper* (2 pt) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8fl oz) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
28	EBDC* (1.6 qt)	1, 2, 3 4, 5, 6 7	7/3, 7/12, 7/23 8/6, 8/16, 8/30 9/12	7/10, 7/18, 7/29 8/7, 8/16, 8/28 9/13
29	Copper* (2 pt)	1, 2, 3 4, 5, 6 7	7/3, 7/12, 7/23 8/6, 8/16, 8/30 9/12	7/10, 7/18, 7/29 8/7, 8/16, 8/28 9/13
30	Cuprofix (2 lb)	1, 2, 3 4, 5, 6 7	7/3, 7/12, 7/23 8/6, 8/16, 8/30 9/12	7/10, 7/18, 7/29 8/7, 8/16, 8/28 9/13
31	Copper* (2 pt) + EBDC* (1.6 qt)	1, 2, 3 4, 5, 6 7	7/3, 7/12, 7/23 8/6, 8/16, 8/30 9/12	7/10, 7/18, 7/29 8/7, 8/16, 8/28 9/13
32	Echo (2 pt)	1, 2, 3 4, 5, 6	7/3, 7/16, 7/28 8/7, 8/23, 9/8	7/10, 7/22, 8/1 8/13, 8/28, 9/9
33	Inspire XT (7 fl oz) + Sodium Bicarb (2.5 lb) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + Sodium Bicarb (2.5 lb) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + Sodium Bicarb (2.5 lb) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
34	Inspire XT (7 fl oz) + Sodium Bicarb (5 lb) + EBDC* (1.6 qt)	1, 3	7/3, 8/6	7/10, 8/12
	Super Tin (8 fl oz) + Sodium Bicarb (5 lb) + EBDC* (1.6 qt)	2	7/23	7/29
	Copper* (2 pt) + Sodium Bicarb (5 lb) + EBDC* (1.6 qt)	4, 5, 6	8/23, 9/4, 9/13	8/29, 9/9
35	Copper* (3 pt)	1, 2, 3 4, 5, 6 7	7/3, 7/12, 7/23 8/6, 8/16, 8/30 9/12	7/10, 7/18, 7/29 8/7, 8/16, 8/28 9/13

*** EBDC = Manzate / Copper = Badge**

**** NIS = Preference**

*****All treatments included MasterLock @ 6.4 fl oz**

Evaluate Fungicide Spray Programs for Control of Cercospora (*Cercospora beticola*) leafspot in Sugarbeets
Parr, Brown City, MI - 2019

Trial Quality: Good
Variety: C - RR059
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.5 **pH:** 6.5 **CEC:** 14.5
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Corn

Rhizoc Level: Low
Cerc Control: See trts.
Problems: Low disease level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 207

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
7	Inspire XT	7 fl oz.	7/10	**0.5**	**$2,226**	**12461**	**234**	**53.3**	**16.6**
	Priaxor + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Enable	8 fl oz.	8/8						
	Flint Extra	3.6 fl oz.	8/21						
	Propulse	13.6 fl oz.	9/5						
5	Inspire XT	7 fl oz.	7/10	**0.5**	**$2,142**	**11725**	**228**	**51.5**	**16.2**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Proline	5.7 fl oz.	8/8						
	Super Tin	8 fl oz.	8/21						
	Enable	8 fl oz.	9/5						
9	Priaxor	8 fl oz.	7/10	**0.6**	**$2,255**	**12455**	**240**	**51.9**	**17.0**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Proline	5.7 fl oz.	8/8						
	Super Tin	8 fl oz.	8/21						
	Priaxor	8 fl oz.	9/5						
10	Inspire XT + Enable	7 fl oz. + 8 fl oz.	7/10	**0.6**	**$2,111**	**11884**	**226**	**52.5**	**16.2**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	8/1						
	Priaxor	8 fl oz.	8/15						
	Proline + Topguard	5.7 fl oz. + 14 fl oz.	8/29						
2	Inspire XT	7 fl oz.	7/10	**0.6**	**$2,216**	**12183**	**233**	**52.2**	**16.6**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Priaxor	8 fl oz.	8/8						
	Proline	5.7 fl oz.	8/21						
	Super Tin	8 fl oz.	9/5						

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on July 1st.**
***All treatments included EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz.**
***EBDC = Manzate / Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Spray Programs for Control of Cercospora (*Cercospora beticola*) leafspot in Sugarbeets Parr, Brown City, MI - 2019

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
12	Quadris	15.5 fl oz.	7/1	**0.8**	**$2,188**	**12313**	**233**	**53.0**	**16.4**
	Propulse	13.6 fl oz.	7/15						
	Super Tin + Topsin	8 fl oz + 20 fl oz.	7/20						
	Delaro + Proline	11 fl oz. + 1.5 fl oz.	8/12						
	Super Tin	8 fl oz.	8/28						
	Inspire XT	7 fl oz.	9/11						
6	Inspire XT	7 fl oz.	7/10	**0.8**	**$2,141**	**12001**	**233**	**51.5**	**16.5**
	Priaxor + Topsin	8 fl oz + 20 fl oz.	7/25						
	Enable	8 fl oz.	8/8						
	Copper	1 qt.	8/21						
	Propulse	13.6 fl oz.	9/5						
3	Inspire XT + N-Demand + Boron	7 fl oz. + 1 gal. + 1 qt.	7/10	**0.8**	**$2,176**	**12130**	**234**	**51.8**	**16.7**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Priaxor + N-Demand + Boron	8 fl oz. + 1 gal. + 1 qt.	8/8						
	Proline + N-Demand + Boron	5.7 fl oz. + 1 gal. + 1 qt.	8/21						
	Super Tin	8 fl oz.	9/5						
4	Inspire XT + Serifel	7 fl oz. + 4 oz.	7/10	**0.8**	$2,055	**11799**	**228**	**51.9**	**16.4**
	Super Tin + Topsin	8 fl oz + 20 fl oz.	7/25						
	Priaxor + Serifel	8 fl oz. + 4 oz.	8/8						
	Proline + Serifel	5.7 fl oz. + 4 oz.	8/21						
	Super Tin	8 fl oz.	9/5						

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on July 1st.**

***All treatments included EBDC @ 1.6 qt., and MasterLock @ 6.4 fl oz.**

***EBDC = Manzate / Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

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MICHIGAN SUGAR

Evaluate Fungicide Spray Programs for Control of Cercospora (*Cercospora beticola*) leafspot in Sugarbeets
Parr, Brown City, MI - 2019

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
11	Inspire XT	7 fl oz.	7/10	**0.9**	**$2,264**	**12604**	**237**	**53.2**	**16.7**
	Priaxor + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Enable	8 fl oz.	8/8						
	Copper + Sodium Bicarb	1 qt. + 5 lb.	8/21						
	Propulse	13.6 fl oz.	9/5						
8	Inspire XT	7 fl oz.	7/10	**0.9**	**$2,236**	**12235**	**234**	**52.3**	**16.7**
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/25						
	Proline	5.7 fl oz.	8/8						
	Super Tin	8 fl oz.	8/21						
	Priaxor	8 fl oz.	9/5						
13	Copper	2 pt.	7/15, 7/29, 8/12, 8/28, 9/11	**1.0**	**$2,146**	11521	**225**	**51.3**	**16.3**
14	Super Tin	8 fl oz.	7/15, 8/28	**1.1**	**$2,155**	11567	**228**	**50.8**	**16.3**
	Copper	2 pt.	7/29, 8/12, 9/11						
1	Untreated			15.5	$1,824	9307	207	45.1	15.3
Average				1.81	$2,152.7	11870.3	230.0	51.59	16.43
LSD 5%				1.84	195.4	996.8	18.2	3.31	1.05
CV %				71.2	6.4	5.9	5.5	4.5	4.5

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on July 1st.**

***All treatments included EBDC @ 1.6 qt., and MasterLock @ 6.4 fl oz.**

***EBDC = Manzate / Copper = Badge**

Comments: This trial was conducted in a good quality, high yielding field that had a history of leafspot problems. The sugarbeet stand was good and there were no outside influences that affected the trial results. The leafspot infestation level was relatively low. All of the treatments provided very good leafspot control. Due to the low disease level, statistical separation of the treatments did not occur. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Spray Programs for Control of Cercospora and Alternaria leafspot in Sugarbeets
Deshano, Auburn MI - 2019

Trial Quality: Good
Variety: C - 333
Planted: April 29
Harvested: Oct 7
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 2.4 **pH:** 8.0 **CEC:** 9.2
P: Above Opt **K:** Opt
Mn: High **B:** Medium
Added N: 139 lbs.
Prev Crop: Corn

Rhizoc Level: Low
Cerc Control: See trts.
Problems: Moderate disease
Seeding Rate: 4.1 inches
Rainfall: 26.64 inches
Beets/100 ft: ~ 197

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage	Net $/A	RWSA	RWST	T/A	% SUC
				26-Sep					
5	Inspire XT	7 fl oz.	7/3	**0.6**	$1,398	**9151**	265	**34.6**	17.4
	Super Tin + Topsin	8 fl oz.	7/16						
	Proline	5.7 fl oz.	7/31						
	Super Tin	8 fl oz.	8/14						
	Enable	8 fl oz.	8/26						
	Copper	1 qt.	9/13						
10	Inspire XT + Enable	7 fl oz. + 8 fl oz.	7/3	**0.8**	$1,439	**9752**	265	**36.8**	17.3
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/23						
	Priaxor	8 fl oz.	8/2						
	Proline + Topguard	5.7 fl oz. + 14 fl oz.	8/16						
	Super Tin	8 fl oz.	8/30						
9	Priaxor	8 fl oz.	7/3	**0.8**	$1,441	**9579**	261	**36.8**	17.1
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Proline	5.7 fl oz.	7/31						
	Super Tin	8 fl oz.	8/14						
	Priaxor	8 fl oz.	8/26						
	Copper	1 qt.	9/13						
11	Inspire XT	7 fl oz.	7/3	**0.9**	$1,364	**9250**	267	**34.6**	17.3
	Priaxor + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Enable	8 fl oz.	7/31						
	Copper + Sodium Bicarb	1 qt. + 5 lb.	8/14						
	Propulse	13.6 fl oz.	8/26						
	Copper + Sodium Bicarb	1 qt. + 5 lb.	9/13						

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on June 25th.**
***All treatments included EBDC @ 1.6 qt., and MasterLock @ 6.4 fl oz.**

***EBDC = Manzate / Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Spray Programs for Control of Cercospora and Alternaria leafspot in Sugarbeets
Deshano, Auburn MI - 2019

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage 26-Sep	Net $/A	RWSA	RWST	T/A	% SUC
7	Inspire XT	7 fl oz.	7/3	**1.1**	$1,363	**9295**	266	**35.0**	17.3
	Priaxor + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Enable	8 fl oz.	7/31						
	Flint Extra	3.6 fl oz.	8/14						
	Propulse	13.6 fl oz.	8/26						
	Copper	1 qt.	9/13						
4	Inspire XT + Serifel	7 fl oz. + 4 oz.	7/3	**1.3**	$1,310	**9230**	268	**34.5**	17.4
	Supertin + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Priaxor + Serifel	8 fl oz. + 4 oz.	7/31						
	Proline + Serifel	5.7 fl oz. + 4 oz.	8/14						
	Super Tin	8 fl oz.	8/26						
	Copper	1 qt.	9/13						
3	Inspire XT + N-Demand + Boron	7 fl oz. + 1 gal. + 1 qt.	7/3	**1.3**	$1,349	**9128**	265	**34.6**	17.2
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Priaxor + N-Demand + Boron	8 fl oz. + 1 gal. + 1 qt.	7/31						
	Proline + N-Demand + Boron	5.7 fl oz. 1 gal. + 1 qt.	8/14						
	Super Tin	8 fl oz.	8/26						
	Copper	1 qt.	9/13						
2	Inspire XT	7 fl oz.	7/3	**1.3**	$1,376	**9115**	266	**34.4**	17.3
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Priaxor	8 fl oz.	7/31						
	Proline	5.7 fl oz.	8/14						
	Super Tin	8 fl oz.	8/26						
	Copper	1 qt.	9/13						

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on June 25th.**
***All treatments included EBDC @ 1.6 qt., and MasterLock @ 6.4 fl oz.**

***EBDC = Manzate / Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Fungicide Spray Programs for Control of Cercospora and Alternaria leafspot in Sugarbeets
Deshano, Auburn MI - 2019

No.	Treatment*	Rate / A	Applic Timing	% Leaf Damage 26-Sep	Net $/A	RWSA	RWST	T/A	% SUC
12	Quadris	15.5 fl oz.	6/25	**1.4**	$1,415	**9648**	267	**36.2**	17.4
	Propulse	13.6 fl oz.	7/9						
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/23						
	Delaro + Proline	11 fl oz. +	8/2						
	Super Tin	8 fl oz.	8/16						
	Inspire XT	7 fl oz.	8/30						
	Copper	1 qt.	9/13						
8	Inspire XT	7 fl oz.	7/3	**1.4**	$1,349	**8896**	262	**33.9**	17.1
	Super Tin + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Proline	5.7 fl oz.	7/31						
	Super Tin	8 fl oz.	8/14						
	Priaxor	8 fl oz.	8/26						
	Copper	1 qt.	9/13						
6	Inspire XT	7 fl oz.	7/3	**1.5**	$1,396	**9463**	259	**36.5**	17.0
	Priaxor + Topsin	8 fl oz. + 20 fl oz.	7/16						
	Enable	8 fl oz.	7/31						
	Copper	1 qt.	8/14						
	Propulse	13.6 fl oz.	8/26						
	Copper	1 qt.	9/13						
1	Untreated			40.8	$1,284	7557	260	29.0	17.1
Average				4.41	$1,373.7	9172.0	264.2	34.74	17.22
LSD 5%				5.01	N.S.	1401.5	N.S.	5.26	N.S.
CV %				79.0	12.1	10.6	3.9	10.5	3.7

****First Application for all treatments except for treatment 12 was EBDC @ 1.6 qt., & MasterLock @ 6.4 fl oz. on June 25th.**

***All treatments included EBDC @ 1.6 qt., and MasterLock @ 6.4 fl oz.**

***EBDC = Manzate / Copper = Badge**

Comments: This trial was conducted in a good quality field with a history of Cercospora *(Cercospora beticola*) and Alternaria (*Alternaria alternata*) leafspot. The leafspot pressure was moderate (40% leaf damage in UTC) and consisted of about 60% Alternaria and 40% Cercospora leafspot. The sugarbeet stand was favorable and there were no outside influences that affected the trial results. All treatments provided very good leafspot control and had improved yields and quality compared to the untreated. More significant differences would have been expected if the leafspot pressure had been higher. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora and Alternaria Leafspot Utilizing Fungicides Approved for use in Canada

Parr, Brown City, MI - 2019

Trial Quality: Fair **-** Good
Variety: C - RR059
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.5 **pH:** 6.5 **CEC:** 14.5
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Corn

Rhizoc Level: Low
Cerc Control: See trts.
Problems: Low disease
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 228

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment***	Rate/A	Applic Timing	% Leaf Damage	Net $/A	RWSA	RWST	T/A	% SUC
				8-Oct					
13	Copper*	2 pt.	7/10	**1.3**	**$1,933**	**10529**	**222**	**47.4**	**15.7**
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	7/24						
	Proline + Tilt + ChampION	5.7 fl oz. + 3.97 fl oz. + 2 lb.	8/5						
	Quadris + Inspire not XT + ChampION	12 fl oz. + 4 fl oz. + 2 lb.	8/21						
	ChampION	2 lb.	9/4						
17	Copper*	2 pt.	7/10	**1.3**	**$1,925**	**10575**	**229**	**46.2**	**16.2**
	Quadris + Inspire not XT + Tilt	12 fl oz. + 4 fl oz. + 3.97 fl oz.	7/24						
	Proline + Tilt + ChampION	5.7 fl oz + 3.97 fl oz. + 2 lb.	8/5						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/21						
	Eminent + Tilt + ChampION	13 fl oz. + 3.97 fl oz. + 2 lb.	9/4						
11	Copper*	2 pt.	7/10	**1.4**	**$2,004**	**10893**	**235**	**46.4**	**16.6**
	Proline + Tilt + ChampION	5.7 fl oz. + 3.97 fl oz. + 2 lb.	7/24						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + Tilt + ChampION	13 fl oz. + 3.97 fl oz. + 2 lb.	8/29						
	ChampION	2 lb.	9/13						

*****All treatments included MasterLock @ 6.4 fl oz.**
****Maintenance spray was applied to all treatments on July 1st, EBDC @ 1.6 qt, and MasterLock 6.4 fl oz.**
***Copper = Badge / EBDC = Manzate**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora and Alternaria Leafspot Utilizing Fungicides Approved for use in Canada

Parr, Brown City, MI - 2019

No.	Treatment*	Rate/A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
4	Penncozeb	2 lb.	7/10	**1.4**	**$2,050**	**11039**	**230**	**47.8**	**16.3**
	Proline + Penncozeb	5.7 fl oz. + 2 lb.	7/19						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/8						
	Eminent + Penncozeb	13 fl oz. + 2 lb.	8/21						
	Penncozeb + ChampION	2 lb. + 2 lb.	9/9						
10	Penncozeb	2 lb.	7/10	**1.6**	**$1,955**	**10737**	**231**	**46.4**	**16.3**
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	7/19						
	Proline + Tilt + Penncozeb	5.7 fl oz. + 3.97 fl oz. + 2 lb.	8/5						
	Quadris + Inspire not XT + Penncozeb	12 fl oz. + 4 fl oz. + 2 lb.	8/21						
	Penncozeb + ChampION	2 lb. + 2 lb.	9/4						
	Eminent + Tilt + Penncozeb	13 fl oz. + 3.97 fl oz + 2 lb.	9/13						
16	Penncozeb	2 lb.	7/10	**1.7**	**$1,855**	**10157**	**221**	**46.0**	15.7
	Quadris + Inspire not XT + Tilt	12 fl oz. + 4 fl oz. + 3.97 fl oz.	7/19						
	Proline + Tilt + Penncozeb	5.7 fl oz. + 3.97 fl oz. + 2 lb.	8/5						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/21						
	Eminent + Tilt Penncozeb	13 fl oz. + 3.97 fl oz. + 2 lb.	9/4						
5	Copper*	2 lb.	7/10	**1.7**	**$1,985**	**10767**	**232**	**46.5**	**16.3**
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	7/24						
	Proline + ChampION	5.7 fl oz. + 2 lb.	8/5						
	Quadris + Inspire not XT + ChampION	12 fl oz. + 4 fl oz. + 2 lb.	8/21						
	ChampION	2 lb.	9/4						

***All treatments included MasterLock @ 6.4 fl oz.**

****Maintenance spray was applied to all treatments on July 1st, EBDC @ 1.6 qt, and MasterLock 6.4 fl oz.**

***Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Control of Cercospora and Alternaria Leafspot Utilizing Fungicides Approved for use in Canada

Parr, Brown City, MI - 2019

No.	Treatment*	Rate/A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
14	Headline	12 fl oz.	7/10	**1.8**	**$1,859**	**10292**	220	**46.9**	15.6
	Proline + Tilt + Penncozeb	5.7 fl oz. + 3.97 fl oz. + 2 lb.	7/24						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + Tilt + Penncozeb	13 fl oz. + 3.97 fl oz. + 2 lb.	8/29						
	Quadris + Inspire not XT + Penncozeb	12 fl oz. + 4 fl oz. + 2 lb.	9/13						
2	Penncozeb	2 lb.	7/10	**1.8**	**$2,005**	**10942**	**230**	**47.6**	**16.3**
	Priaxor + Topsin + Penncozeb	6.2 fl oz + 10 fl oz. + 2 lb.	7/19						
	Proline + Penncozeb	5.7 fl oz. + 2 lb.	8/5						
	Quadris + Inspire not XT + Penncozeb	12 fl oz. + 4 fl oz. + 2 lb.	8/21						
	Penncozeb + ChampION	2 lb. + 2 lb.	9/4						
	Inspire not XT + Penncozeb	13 fl oz. + 2 lb.	9/13						
15	Headline	12 fl oz.	7/10	**2.0**	**$1,913**	**10633**	**232**	**45.9**	**16.2**
	Proline + Tilt + ChampION	5.7 fl oz. + 3.97 fl oz. + 2 lb.	7/24						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + Tilt + ChampION	13 fl oz. + 3.97 fl oz. + 2 lb.	8/29						
	Quadris + Inspire not XT + ChampION	12 fl oz. + 4 fl oz. + 2 lb.	9/13						
8	Penncozeb	2 lb.	7/10	**2.1**	**$2,019**	**10934**	**224**	**48.8**	**16.0**
	Quadris + Inspire not XT + Tilt	12 fl oz. + 4 fl oz. + 3.97 fl oz.	7/19						
	Proline + Penncozeb	5.7 fl oz. + 2 lb.	8/5						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/21						
	Eminent + Penncozeb	13 fl oz. + 2 lb.	9/4						

***All treatments included MasterLock @ 6.4 fl oz.**

****Maintenance spray was applied to all treatments on July 1st, EBDC @ 1.6 qt, and MasterLock 6.4 fl oz.**

***Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Control of Cercospora and Alternaria Leafspot Utilizing Fungicides Approved for use in Canada

Parr, Brown City, MI - 2019

No.	Treatment*	Rate/A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
12	Penncozeb	2 lb.	7/10	**2.2**	**$1,994**	**10809**	**226**	**47.9**	**15.9**
	Proline + Tilt + Penncozeb	5.7 fl oz. + 3.97 fl oz. + 2 lb.	7/19						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/8						
	Eminent + Tilt + Penncozeb	13 fl oz. + 3.97 fl oz. + 2 lb.	8/21						
	Penncozeb + ChampION	2 lb. + 2 lb.	9/9						
9	Copper*	2 lb.	7/10	**2.2**	**$2,050**	**11082**	**230**	**48.1**	**16.4**
	Quadris + Inspire not XT + Tilt	12 fl oz. + 4 fl oz + 3.97 fl oz.	7/24						
	Proline + ChampION	5.7 fl oz. + 2 lb.	8/5						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/21						
	Eminent + ChampION	13 fl oz. + 2 lb.	9/4						
3	Copper*	2 lb.	7/10	**2.3**	**$1,990**	**10767**	**228**	**47.2**	**16.2**
	Proline + ChampION	5.7 fl oz. + 2 lb.	7/24						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + ChampION	13 fl oz. + 2 lb.	8/29						
	ChampION	2 lb.	9/13						
7	Headline	12 fl oz.	7/10	**2.3**	**$1,961**	**10820**	**237**	45.6	**16.7**
	Proline + ChampION	5.7 fl oz.	7/24						
	Priaxor + Topsin + ChampION	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + ChampION	13 fl oz. + 2 lb.	8/29						
	Quadris + Inspire not XT + ChampION	12 fl oz. + 4 fl oz. + 2 lb.	9/13						

***All treatments included MasterLock @ 6.4 fl oz.**

****Maintenance spray was applied to all treatments on July 1st, EBDC @ 1.6 qt, and MasterLock 6.4 fl oz.**

***Copper = Badge**

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

Control of Cercospora (*Cercospora beticola*) Leafspot Utilizing Fungicides Approved for use in Canada
Parr, Brown City, MI - 2019

No.	Treatment*	Rate/A	Applic Timing	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC
6	Headline	12 fl oz.	7/10	**3.1**	**$1,993**	**10913**	**228**	**47.9**	**16.2**
	Proline + Penncozeb	5.7 fl oz. + 2 lb.	7/24						
	Priaxor + Topsin + Penncozeb	6.2 fl oz. + 10 fl oz. + 2 lb.	8/12						
	Eminent + Penncozeb	13 fl oz. + 2 lb.	8/29						
	Quadris + Inspire not XT + Penncozeb	12 fl oz. + 4 fl oz. + 2 lb.	9/13						
1	Untreated			38.7	$1,609	8112	201	40.4	14.8
	Average			4.04	$1,947.1	10588.2	226.8	46.65	16.08
	LSD 5%			2.64	212.5	1071.1	16.1	2.98	0.83
	CV %			56.8	9.5	8.8	6.2	5.6	4.5

***All treatments included MasterLock @ 6.4 fl oz.**

****Maintenance spray was applied to all treatments on July 1st, EBDC @ 1.6 qt, and MasterLock 6.4 fl oz.**

***Copper = Badge**

Comments: The trial was conducted in a good quality, high yielding field with a low to moderate leafspot infestation. Cercospora spray programs were evaluated which included fungicides approved for use in Canada. Most spray programs began in early July with an EBDC or Copper application. Beginning applications with Headline did not provide as good of results as with a copper or EBDC. It appeared that the programs that included copper provided slightly better results than programs that included an EBDC. All of the treatments provided acceptable leafspot control and all were significantly better than the untreated check. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Alternaria (*Alternaria alternata*) and Cercospora (*Cercospora beticola*) Leafspot in Sugarbeets
Answer, Bach, MI - 2019

Trial Quality: Good
Variety: C - RR059
Planted: May 17
Harvested: Oct 10
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 2.5 **pH:** 8.0 **CEC:** 10.9
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Soybeans

Rhizoc Level: Low
DSV Level: High
Problems: None
Seeding Rate: 4.1 inches
Rainfall: 19.08 inches
Beets/100 ft: ~ 219

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Fungicide Treatment**	% Leaf Damage 7-Oct	% Leaf Damage 5-Sep	Net $/A	RWSA	RWST	T/A	% SUC
1	Super Tin (8 fl oz.) + Topsin (20 fl oz.) + EBDC*	**1.1**	**0.1**	**$1,607**	**10818**	**286**	**37.8**	**18.7**
8	Delaro (11 fl oz.) + Proline (1.7 fl oz.) + EBDC*	**2.9**	**0.1**	**$1,462**	**10076**	**283**	**35.7**	**18.5**
7	Inspire XT (7 fl oz.) + Proline (5.7 fl oz.) + EBDC*	**3.0**	**0.1**	**$1,608**	**11108**	**285**	**39.1**	**18.6**
11	Priaxor (8 fl oz.) + Topsin (20 fl oz.) + EBDC*	3.3	**0.1**	**$1,403**	**9853**	**273**	**36.1**	**18.0**
6	Provysol (5 fl oz.) + EBDC*	3.3	**0.1**	**$1,451**	**9976**	**280**	**35.6**	**18.4**
2	Super Tin (8 fl oz.) + EBDC*	3.6	**0.7**	**$1,493**	**10000**	**283**	**35.3**	**18.6**
5	Proline (5.7 fl oz.) + EBDC*	3.7	**0.1**	**$1,579**	**10717**	**284**	**37.7**	**18.6**
3	Inspire XT (7 fl oz.) + EBDC*	3.8	**0.1**	$1,333	9146	**278**	32.9	**18.4**
4	Inspire XT (7 fl oz.) + Topsin (20 fl oz.) + EBDC*	4.0	**0.1**	**$1,600**	**10908**	**282**	**38.7**	**18.7**
14	Inspire XT (7 fl oz.) + Copper* (2 pt.)	4.1	**0.6**	$1,332	9218	**276**	**33.5**	**18.2**
10	Priaxor (8 fl oz.) + EBDC*	4.9	**1.1**	$1,213	8568	**276**	31.1	**18.3**
9	Copper* (2 pt.) + EBDC*	5.1	**0.4**	**$1,433**	**9834**	**284**	**34.7**	**18.6**
12	Flint Extra (3.6 fl oz.) + EBDC*	6.8	**0.1**	**$1,441**	**9911**	**279**	**35.7**	**18.4**
13	Headline (12 fl oz.) + EBDC*	7.5	**0.1**	**$1,430**	**9879**	**279**	**35.5**	**18.3**
15	Untreated	98.0	25.3	$1,000	6184	248	24.9	16.8
Average		10.35	1.93	$1,425.7	9,746.5	278.3	34.95	18.34
LSD 5%		2.15	4.60	239.0	1,478.1	17.9	5.64	1.10
CV %		12.4	142.3	10.0	9.1	3.9	9.7	3.6

**** Fungicide Trt:** Main trt applied in 2nd and 4th applic, Manzate applied in 1st, 3rd and 5th, Manzate + Badge in 6th

**** All treatments included MasterLock @ 6.4 fl oz**

*** EBDC =** Manzate @1.6 qt. / **Copper =** Badge

Comments: The trial was located in a good quality field. Sugarbeet emergence was good and there were no outside influences, such as root rots, that influenced trial results. The disease level was very high and ALS was more prevalent than CLS. Super Tin + Topsin gave the best overall results followed by Inspire XT + Proline, Delaro, Priaxor + Topsin and Provysol. Strobi and Copper treatments were the least effective. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.

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

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Control of Alternaria (*Alternaria alternata*) and Cercospora (*Cercospora beticola*) Leafspot in Sugarbeets
Answer, Bach, MI - 2019

No.	Treatment	Application	Date
1	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/26, 8/20
	EBDC* + MasterLock + Super Tin (8 fl oz.) + Topsin (20 fl oz.)	2nd, 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6 th	8/30
2	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/26, 8/20
	EBDC* + MasterLock + Super Tin (8 fl oz.)	2nd , 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6th	8/30
3	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Inspire XT (7 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6
4	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Inspire XT (7 fl oz.) + Topsin (20 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6
5	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Proline (5.7 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6
6	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Provysol (5 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6
7	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Proline (5.7 fl oz.) + Inspire XT (7 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6

No.	Treatment	Application	Date
8	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	EBDC* + MasterLock + Delaro (11 fl oz.) + Proline (1.7 fl oz.)	2nd, 4th	7/12, 8/9
	EBDC* + MasterLock + Copper*	6th	9/6
9	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/22, 8/12
	EBDC* + MasterLock + Copper*	2nd, 4th, 6th, 7th	7/12, 8/2, 8/22, 9/6
10	EBDC* + MasterLock	1st, 3rd, 5th	7/13, 7/26, 8/20
	EBDC* + MasterLock + Priaxor (8 fl oz.)	2nd, 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6th	8/30
11	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/26, 8/20
	EBDC* + MasterLock + Priaxor (8 fl oz.) + Topsin (20 fl oz.)	2nd, 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6th	8/30
12	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/26, 8/20
	EBDC* + MasterLock + Flint Extra (3.6 fl oz.)	2nd, 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6th	8/30
13	EBDC* + MasterLock	1st, 3rd, 5th	7/3, 7/26, 8/20
	EBDC* + MasterLock + Headline (12 fl oz.)	2nd, 4th	7/12, 8/5
	EBDC* + MasterLock + Copper*	6th	8/30
14	Copper* + MasterLock	1st, 3rd, 5th	7/3, 7/30, 8/26
	Copper* + MasterLock + Inspire XT (7 fl oz.)	2nd, 4th	7/12, 8/9
	Copper* + MasterLock + EBDC*	6th	9/6
15	Untreated		

*** EBDC** = Manzate (1.6 qt.), **Copper =** Badge (2 pt.), **MasterLock @ 6.4 fl oz.**

Evaluate Sticker / Spreaders added to Fungicides for *Cercospora beticola* and *Alternaria alternata* Leafspot Control in Sugarbeets

Wackerle, Pinconning - 2019

Trial Quality: Good
Variety: C - G333NT
Planted: May 14
Harvested: Sept 30
Plots: 6 rows X 38 ft, 3 reps
Row Spacing: 22 inches

Soil Info: Sandy Clay Loam
%OM: 2.3 **pH:** 7.7 **CEC:** 9.0
P: Above Opt **K:** Opt
Mn: Medium **B:** Low
Added N: 135 lbs.
Prev Crop: Wheat

Rhizoc Control: Fair - Good
DSV Level: High
Problems: None
Seeding Rate: 4.1 inches
Rainfall: 20.02 inches
Beets/100 ft: ~ 185

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

Sticker Effect (average over treatments)

No.	Sticker	% Leaf Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
		25-Sep	Avg 4					
1	MasterLock (6.4 fl oz)	**3.3**	**0.3**	**$1,501**	**9492**	263	**36.1**	**17.1**
5	Accudrop (3 fl oz)	**4.7**	**0.2**	**$1,491**	**9488**	269	**35.3**	**17.4**
3	Reguard (12 fl oz)+ Diligence (1.5 fl oz)	**5.8**	**0.2**	**$1,484**	**9513**	269	**35.4**	**17.3**
2	Reguard (12 fl oz)	**6.3**	**0.1**	**$1,481**	**9466**	266	**35.6**	**17.1**
4	Reguard (12 fl oz) + MasterLock (6.4 fl oz)	**6.5**	**0.5**	$1,437	**9320**	265	**35.2**	**17.1**
11	No Sticker	**6.6**	**0.2**	**$1,521**	**9566**	267	**35.8**	**17.2**
10	Cerium Elite (8 fl oz)	7.8	**0.2**	**$1,501**	**9543**	268	**35.6**	**17.3**
9	FS Talyx (4 fl oz)	8.2	**0.2**	**$1,445**	**9278**	264	**35.2**	**17.1**
8	Cohere (1 pt) + Justified (1 pt) + Coron (2 qt)	10.6	7.0	$1,299	8474	261	32.5	16.9
6	Cohere (1 pt) + Justified (1 pt)	10.8	7.2	**$1,445**	**9214**	266	**34.7**	**17.2**
7	Cohere (1 pt) + Justified (2 pt)	16.8	17.0	$1,305	8418	262	32.1	**17.0**
	Average	7.95	3.01	$1,446.4	9252.1	265.5	34.86	17.17
	LSD 5%	3.75	1.15	75.6	446.1	N.S.	1.67	0.40
	CV %	58.4	47.2	6.5	6.0	3.3	5.9	2.9

Fungicide Program Effect (average over stickers)

No.	Fungicide Program	% Leaf Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
		25-Sep	Avg 4					
1	Triazole/Strobilurin	**7.0**	**0.7**	$1,461	9382	266	35.2	17.2
2	Protectant	8.8	5.3	$1,432	9122	265	34.5	17.1
	Average	7.95	3.01	$1,446.4	9252.1	265.5	34.86	17.17
	LSD 5%	1.06	1.00	N.S.	N.S.	N.S.	N.S.	N.S.
	CV %	29.7	73.9	8.2	7.6	1.9	7.5	1.7

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Sticker / Spreaders added to Fungicides for *Cercospora beticola* and *Alternaria alternata* Leafspot Control in Sugarbeets

Wackerle, Pinconning - 2019

No.	Treatment*	Sticker	# App	% Leafspot Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
				25-Sep	Avg 4					
1	Triazole/Strobulrin	MasterLock	5	**3.0**	**0.0**	**$1,504**	**9621**	**261**	**36.9**	**17.0**
2	Triazole/Strobulrin	Reguard	5	**3.3**	**0.1**	**$1,457**	**9393**	**265**	**35.5**	**17.1**
4	Triazole/Strobulrin	Reguard + MasterLock	5	**3.7**	**0.2**	$1,410	**9205**	**266**	**34.7**	**17.2**
5	Triazole/Strobulrin	Accudrop	5	**4.7**	**0.1**	**$1,497**	**9579**	**267**	**35.8**	**17.3**
3	Triazole/Strobulrin	Reguard + Diligence	5	**5.7**	**0.1**	**$1,473**	**9426**	**269**	**35.1**	**17.3**
6	Triazole/Strobulrin	Cohere + Justified (1pt)	5	**7.5**	**1.3**	**$1,470**	**9385**	**267**	**35.2**	**17.2**
8	Triazole/Strobulrin	Cohere + Justified (1pt) + Coron	5	8.8	**1.4**	$1,407	**9157**	**265**	**34.5**	**17.2**
9	Triazole/Strobulrin	FS Talyx	5	9.3	**0.2**	**$1,434**	**9210**	**265**	**34.8**	**17.1**
11	Triazole/Strobulrin	No Sticker	5	9.8	**0.2**	**$1,517**	**9613**	**269**	**35.7**	**17.4**
7	Triazole/Strobulrin	Cohere + Justified (2pt)	5	10.2	4.4	**$1,422**	**9154**	**265**	**34.6**	**17.2**
10	Triazole/Strobulrin	Cerium Elite	5	11.3	**0.1**	**$1,477**	**9460**	**271**	**34.9**	**17.5**
22	Protectant	No Sticker	6	**3.3**	**0.1**	**$1,524**	**9519**	**265**	**35.9**	**17.1**
12	Protectant	MasterLock	6	**3.7**	**0.6**	**$1,499**	**9362**	**264**	**35.4**	**17.1**
21	Protectant	Cerium Elite	6	**4.3**	**0.3**	**$1,524**	**9625**	**265**	**36.3**	**17.2**
16	Protectant	Accudrop	6	**4.7**	**0.2**	**$1,485**	**9397**	**271**	**34.8**	**17.5**
14	Protectant	Reguard + Diligence	6	**5.8**	**0.4**	**$1,494**	**9601**	**269**	**35.7**	**17.3**
20	Protectant	FS Talyx	6	**7.0**	**0.3**	**$1,456**	**9346**	**264**	**35.5**	**17.1**
13	Protectant	Reguard	6	9.3	**0.2**	**$1,506**	**9540**	**267**	**35.7**	**17.2**
15	Protectant	Reguard + MasterLock	6	9.3	**0.9**	**$1,463**	**9434**	**264**	**35.8**	**17.1**
19	Protectant	Cohere + Justified (1pt) + Coron	5	12.3	12.6	$1,191	7792	256	30.5	16.6
17	Protectant	Cohere + Justified (1pt)	6	14.0	13.2	**$1,420**	**9044**	**266**	34.1	**17.2**
18	Protectant	Cohere + Justified (2pt)	6	23.5	29.6	$1,189	7682	259	29.6	**16.9**
Average				7.94	3.01	$1,446.4	9252.1	265.5	34.86	17.17
LSD 5%				5.31	1.63	106.9	630.9	10.0	2.37	0.57
CV%				58.4	47.2	6.5	6.0	3.3	5.9	2.9

***Rates applied listed on pages 5 & 6**

Comments: The trial was conducted in a good quality field. There were no influences such as dead beets or stand problems that affected the results. The leafspot pressure was high (mostly CLS). The following stickers were evaluated: MasterLock; Reguard; Reguard + Diligence; Reguard + MasterLock; Accudrop; Cohere + Justified (1 pt); Cohere + Justified (2 pt); Cohere + Justified (1 pt) + Coron; FS Talyx and Cerium Elite. The stickers were tested with 1.) a Triazole based program and 2.) a Protectant Program. There were not many significant differences with respect to leafspot control except for treatments which caused significant phytotoxicity (Cohere + Justified) especially at the 2 pt rate of Justified. Three sticker treatments which caused significant sugarbeet leaf injury (phytotoxicity) were Cohere + Justified (1 pt), Cohere + Justified (2 pt) and Cohere + Justified (1 pt) + Coron. The protectant program (Super Tin included) had more sugarbeet phytotoxicity than the Triazole based program.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Sticker / Spreaders added to Fungicides for Cercospora (*Cercospora beticola)* Leafspot Control in Sugarbeets

Parr, Brown City - 2019

Trial Quality: Good
Variety: C - RR059
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 3 reps
Row Spacing: 22 inches

Soil Info: Loam
%OM: 4.4 **pH:** 6.8 **CEC:** 13.8
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs
Prev Crop: Corn

Rhizoc Control: Good
DSV Level: High
Problems: Low CLS level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~235

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

Sticker Effect (average over treatments)

No.	Sticker	% Leaf Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
		8-Oct	Avg 4					
5	Accudrop (3 fl oz)	**0.6**	**1.0**	**$2,131**	**11418**	228	**50.0**	16.2
3	Reguard (12 fl oz) + Diligence (1.5 fl oz)	**0.6**	2.6	**$2,033**	**10974**	228	**48.2**	16.2
4	Reguard (12 fl oz) + MasterLock (6.4 fl oz)	**0.6**	3.1	$2,002	**10891**	230	47.4	16.3
8	Cohere (1 pt) + Justified (1pt) + Coron (2 qt)	**0.6**	8.0	$1,921	10450	224	46.7	16.0
2	Reguard (12 fl oz)	**0.8**	**1.1**	$2,012	**10842**	225	**48.3**	16.0
1	MasterLock (6.4 fl oz)	**0.9**	**2.1**	**$2,138**	**11400**	231	**49.3**	16.3
11	No Sticker	**0.9**	**1.4**	**$2,067**	**11009**	229	**48.2**	16.3
10	Cerium Elite (8 fl oz)	**0.9**	**2.1**	**$2,059**	**11045**	225	**49.2**	16.0
9	FS Talyx (4 fl oz)	**1.5**	**1.8**	**$2,056**	**11084**	232	**47.9**	16.5
6	Cohere (1 pt) + Justified (1pt)	1.6	10.2	$2,005	10772	234	46.1	16.6
7	Cohere (1 pt) + Justified (2pt)	3.5	19.4	$1,844	9981	228	43.7	16.2
	Average	1.15	4.81	$2,024.5	10896.9	228.5	47.73	16.22
	LSD 5%	0.93	1.43	119.3	605.7	N.S.	2.11	N.S.
	CV %	99.6	36.7	7.3	6.9	5.4	5.5	4.4

Fungicide Program Effect (average over stickers)

No.	Fungicide Program	% Leaf Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
		8-Oct	Avg 4					
1	Triazole/Strobilurin	**1.0**	**2.5**	**$2,049**	**11062**	231	47.9	16.4
2	Protectant	1.3	7.1	$2,000	10732	226	47.6	16.1
	Average	1.15	4.81	$2,024.5	10896.9	228.5	47.73	16.22
	LSD 5%	0.26	1.18	39.8	202.4	N.S.	N.S.	N.S.
	CV %	49.3	55.0	4.4	4.2	4.3	3.4	2.8

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Sticker / Spreaders added to Fungicides for Cercospora (*Cercospora beticola)* Leafspot Control in Sugarbeets

Parr, Brown City - 2019

No.	Treatment*	Sticker	# App	% Leafspot Damage	% Phyto	Net $/A	RWSA	RWST	T/A	% SUC
				8-Oct	Avg 4					
5	Triazole/Strobilurin	Accudrop	5	**0.3**	**1.0**	**$2,093**	**11270**	**226**	**49.9**	**16.0**
4	Triazole/Strobilurin	Reguard + MasterLock	5	**0.4**	2.6	**$2,050**	**11173**	**237**	**47.2**	**16.7**
3	Triazole/Strobilurin	Reguard + Diligence	5	**0.4**	**1.0**	**$2,056**	**11069**	**232**	**47.8**	**16.5**
8	Triazole/Strobilurin	Cohere + Justified (1 pt) + Coron	5	**0.5**	3.9	**$2,021**	**10994**	**228**	**48.3**	**16.2**
10	Triazole/Strobilurin	Cerium Elite	5	**0.6**	**1.2**	**$2,006**	**10827**	224	**48.3**	15.9
2	Triazole/Strobilurin	Reguard	5	**0.8**	**0.2**	**$2,046**	**11076**	**225**	**49.2**	**16.0**
1	Triazole/Strobilurin	MasterLock	5	**1.0**	**0.1**	**$2,172**	**11669**	**237**	**49.2**	**16.6**
6	Triazole/Strobilurin	Cohere + Justified (1 pt)	5	**1.2**	4.9	**$2,052**	**11030**	**240**	45.9	**16.9**
11	Triazole/Strobilurin	No Sticker	5	**1.4**	**0.5**	**$2,011**	10779	**229**	**47.1**	**16.3**
9	Triazole/Strobilurin	FS Talyx	5	1.7	**1.3**	**$2,125**	**11431**	**233**	**49.0**	**16.6**
7	Triazole/Strobilurin	Cohere + Justified (2 pt)	5	2.8	11.2	$1,911	10358	**232**	44.7	**16.4**
22	Protectant	No Sticker	6	**0.5**	2.3	**$2,124**	**11239**	**228**	**49.2**	**16.2**
12	Protectant	MasterLock	6	**0.7**	4.2	**$2,104**	**11131**	**225**	**49.4**	**16.0**
13	Protectant	Reguard	6	**0.8**	**2.0**	$1,978	10607	224	**47.4**	**16.0**
19	Protectant	Cohere + Justified (1 pt) + Coron	6	**0.8**	12.2	$1,822	9906	219	45.2	**15.8**
14	Protectant	Reguard + Diligence	6	**0.9**	4.2	**$2,010**	**10880**	224	**48.5**	15.9
15	Protectant	Reguard + MasterLock	6	**0.9**	3.6	$1,954	10609	222	**47.7**	15.9
16	Protectant	Accudrop	6	**0.9**	**1.0**	**$2,170**	**11565**	**231**	**50.1**	**16.4**
21	Protectant	Cerium Elite	6	**1.3**	3.1	**$2,111**	**11263**	**225**	**50.1**	**16.0**
20	Protectant	FS Talyx	6	**1.3**	2.4	$1,987	10737	**230**	46.7	**16.3**
17	Protectant	Cohere + Justified (1 pt)	6	2.1	15.6	$1,958	10514	**227**	46.2	**16.2**
18	Protectant	Cohere + Justified (2 pt)	6	4.3	27.6	$1,778	9603	**225**	42.8	**16.1**
Average				1.16	4.81	2024.5	10896.9	228.5	47.73	16.22
LSD 5%				1.32	2.02	168.7	856.5	14.2	2.99	0.81
CV				99.6	36.7	7.3	6.9	5.4	5.5	4.4

Comments: The trial was conducted in a good quality field. There were no influences such as dead beets or stand problems that affected the results. The leafspot pressure was low to moderate. The following stickers were evaluated: MasterLock; Reguard; Reguard + Diligence; Reguard + MasterLock; Accudrop; Cohere + Justified (1 pt); Cohere + Justified (2 pt); Cohere + Justified (1 pt) + Coron; FS Talyx and Cerium Elite. The stickers were tested with 1.) a Triazole based program and 2.) a Protectant Program. There were not many significant differences with respect to leafspot control except for treatments which caused significant phytotoxicity (Cohere + Justified) especially at the 2 pt rate of Justified. Three sticker treatments which caused significant sugarbeet leaf injury (phytotoxicity) were Cohere + Justified (1 pt), Cohere + Justified (2 pt) and Cohere + Justified (1 pt) + Coron. The protectant program (Super Tin included) had more sugarbeet phytotoxicity than the Triazole based program.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Evaluate Sticker / Spreaders added to Fungicides for *Cercospora beticola* and *Alternaria alternata* Leafspot Control in Sugarbeets

Wackerle, Pinconning / Parr, Brown City

No.	Program	Sticker	Treatment	Date Wackerle	Date Parr
1	Triazole/ Strobilurin	MasterLock (6.4 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
2	Triazole/ Strobilurin	Reguard (12 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
3	Triazole/ Strobilurin	Reguard (12 fl oz) + Diligence (1.5 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
4	Triazole/ Strobilurin	Reguard (12 fl oz) +MasterLock (6.4 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
5	Triazole/ Strobilurin	Accudrop (3 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
6	Triazole/ Strobilurin	Cohere (1 pt) + Justified (1 pt)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
7	Triazole/ Strobilurin	Cohere (1 pt) + Justified (2 pt)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
8	Triazole/ Strobilurin	Cohere (1 pt) + Justified (1 pt) + Coron (2 qt)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
9	Triazole/ Strobilurin	FS Taylx (4 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6

Evaluate Sticker / Spreaders added to Fungicides for *Cercospora beticola* and *Alternaria alternata* Leafspot Control in Sugarbeets

Wackerle, Pinconning / Parr, Brown City

No.	Program	Sticker	Treatment	Date Wackerle	Date Parr
10	Triazole/ Strobilurin	Cerium Elite (8 fl oz)	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
11	Triazole/ Strobilurin	No Sticker	Proline (5.7 fl oz) + Manzate (1.6 qt)	7/9	7/1
			Priaxor (8 fl oz) + Manzate (1.6 qt)	7/26	7/29
			Super Tin (8 fl oz) + Manzate (1.6 qt)	8/9	8/12
			Manzate (1.6 qt) + Badge (2 pt)	8/23	8/28
			Inspire XT (7 fl oz) + Manzate (1.6 qt)	9/4	9/6
12	Protectant	MasterLock (6.4 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
13	Protectant	Reguard (12 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
14	Protectant	Reguard (12 fl oz) + Diligence (1.5 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
15	Protectant	Reguard (12 fl oz) + MasterLock (6.4 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
16	Protectant	Accudrop (3 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
17	Protectant	Cohere (1 pt) + Justified (1 pt)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
18	Protectant	Cohere (1 pt) + Justified (2 pt)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
19	Protectant	Cohere (1 pt) + Justified (1 pt) + Coron (2 qt)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
20	Protectant	FS Taylx (4 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
21	Protectant	Cerium Elite (8 fl oz)	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13
22	Protectant	No Sticker	Super Tin (8 fl oz) + Manzate (1.6 qt)	7/9, 8/2, 8/26	7/1, 8/5, 8/29
			Manzate (1.6 qt) + Badge (2 pt)	7/23, 8/16, 9/12	7/25, 8/19, 9/13

Cercospora Leafspot (*Cercospora beticola*) Control in Sugarbeets With Copper Fungicides. Parr, Brown City, MI - 2019

Trial Quality: Fair - Good
Variety: C - G333NT
Planted: May 14
Harvested: Oct 17
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.5 **pH:** 6.5 **CEC:** 14.5
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Previous Crop: Corn

Rhizoc Level: Low
DSV Level: Very High
Problems: Low CLS level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 193

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment*	Rate/A	% Leafspot Damage	Net $/A	RWSA	RWST	T/A	% SUC	% CJP
			8-Oct						
6	Cuprofix	2 lb.	**1.4**	**$1,978**	**10752**	**239**	**45**	**16.6**	**94.1**
4	Badge	2 pt.	**1.5**	**$1,965**	**10683**	**241**	**44**	**16.6**	**94.4**
3	ChampION	2 lb.	**2.3**	**$1,908**	**10390**	**240**	**43**	**16.5**	**94.4**
2	Champ 2F	2 pt.	**2.0**	**$1,894**	**10318**	**236**	**44**	**16.6**	93.5
5	Agri-Life	57 fl oz.	**5.5**	$1,760	**9776**	**230**	**42**	**16.2**	93.4
1	Untreated Check		27.0	$1,512	7821	214	36	15.5	92.5
Average			6.60	$1,836.3	9956.6	233.3	42.5	16.34	93.70
LSD 5%			4.61	203.69	1053.3	10.4	4.1	0.55	0.74
CV %			46.3	7.4	7.0	3.0	6.5	2.2	0.5

***All treatments included MasterLock @ 6.4 fl oz.**

Comments: Cuprofix, Badge SC, ChampION, Champ 2F and Agri-Life (copper fungicides) were applied to sugarbeets for control of Cercospora leafspot. The disease level was low to moderate. The trial was located in a high yielding field and there were no outside influences, such as root rots, that affected the trial results. Cuprofix, Badge, ChampION and Champ 2F provided good and similar levels of leafspot control. The Agri-Life treatment appeared to be less effective but was significantly better than the untreated check. None of the treatments caused phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Control of Cercospora (*Cercospora beticola*) Leafspot With Fungicides Using Six Different Spray Tips

Parr, Brown City, MI - 2019

Trial Quality: Fair - Good
Varieties: C - RR059
Planted: May 14
Harvested: Oct 17
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.5 **pH**: 6.5 **CEC:** 14.5
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Previous Crop: Corn

Rhizoc Level: Low
Cerc. Control: See trts.
Problems: Low CLS level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 205

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

Fungicide Effect (averaged over nozzles)

No.	Treatment	% Leaf Damage 19-Sep	Net $/A	RWSA	RWST	T/A	% SUC	% CJP
2	Manzate Max	0.9	$2,055	11617	249	46.7	17.4	93.8
1	Triazole Program	1.1	$1,903	11289	243	46.5	17.0	93.5
Average		1.00	1979.0	11453.0	246.0	46.60	17.20	93.65
LSD 5%		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
CV%		23.9	4.5	4.2	5.2	5.5	4.8	0.9

Nozzle Effect (averaged over fungicide treatments)

No.	Treatment	% Leaf Damage 19-Sep	Net $/A	RWSA	RWST	T/A	% SUC	% CJP
2	Turbo TwinJet - Medium	0.8	$1,991	11520	243	47.4	17.0	93.6
1	JD Hypro 3D - Fine	0.9	**$2,091**	**12065**	**254**	47.5	17.7	93.7
4	Greenleaf TDAT - Medium	1.1	$1,933	11201	237	47.3	16.8	93.2
6	Turbo Tee Jet Induct. - Coarse	1.1	$1,927	11172	247	45.3	17.2	93.8
5	TeeJet AIXR - Medium	1.1	$1,904	11045	240	46.2	16.9	93.4
3	TeeJet Flat Fan - Very Fine	1.3	**$2,027**	11717	**255**	46.0	17.6	94.1
Average		1.05	1978.8	11453.3	246.0	46.62	17.20	93.63
LSD 5%		N.S.	95.25	520.8	6.8	N.S.	N.S.	N.S.
CV%		52.3	4.7	4.5	2.7	5.1	2.0	0.7

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

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Control of Cercospora (*Cercospora beticola*) Leafspot With Fungicides Using Six Different Spray Tips

Parr, Brown City, MI - 2019

No.	Treatment	Fung Appl.	Droplet Size	% Leaf Damage 19-Sep	Net $/A	RWSA	RWST	T/A	% SUC	% CJP
2	Turbo TwinJet	Program*	Medium	**0.75**	$1,944	**11513**	239	48.1	16.8	**93.6**
7	JD Hypro 3D	EBDC**	Fine	**0.75**	**$2,153**	**12156**	**253**	48.0	**17.6**	**93.8**
8	Turbo TwinJet	EBDC**	Medium	**0.75**	**$2,038**	**11526**	**247**	46.6	**17.3**	**93.7**
11	TeeJet AIXR	EBDC**	Medium	**0.75**	**$2,058**	**11637**	**249**	46.8	**17.4**	**93.5**
6	Turbo TeeJet Induct.	Program*	Coarse	**0.88**	$1,880	11167	**247**	45.3	17.2	**93.6**
1	JD Hypro 3D	Program*	Fine	**1.0**	**$2,028**	**11974**	**255**	47.0	**17.8**	**93.6**
9	TeeJet Flat Fan	EBDC**	Fine	**1.0**	**$2,059**	**11639**	**257**	45.3	**17.7**	**94.2**
10	Greenleaf TDAT	EBDC**	Medium	**1.0**	**$2,046**	**11568**	242	47.9	17.0	**93.5**
4	Greenleaf TDAT	Program*	Medium	**1.1**	$1,819	10834	232	46.7	16.6	92.8
12	Turbo TeeJet Induct.	EBDC**	Coarse	**1.4**	$1,974	11178	**248**	45.3	17.1	**94.1**
3	TeeJet Flat Fan	Program*	Very Fine	**1.5**	$1,995	**11795**	**253**	46.7	**17.5**	**94.0**
5	TeeJet AIXR	Program*	Medium	**1.5**	$1,750	10452	230	45.5	16.3	**93.2**

Average	1.03	$1,978.7	11453.2	246.0	46.60	17.19	93.64
LSD 5%	N.S.	134.7	736.5	9.6	N.S.	0.50	0.96
CV %	52.3	4.7	4.5	2.7	5.2	2.0	0.7

***Spray Program for treatments 1-6**

1st appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.)
2nd appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Proline (5.7 fl oz.)
3rd appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Super Tin (8 fl oz.)
4th appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Priaxor (8 fl oz.)
5th appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Super Tin (8 fl oz.)
6th appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Inspire XT (7 fl oz.)

****Spray Program for treatments 7-12**

1st - 7th appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.)
8th appl. - EBDC* (1.6 qt.) + MasterLock (6.4 fl oz.) + Badge (2 pt.)

****EBDC = Manzate Max**

Comments: The trial was located in a good quality, high yielding field. There were no outside influences such as root rot that had an effect on the trial. The leafspot level was low. Six different nozzle tips were evaluated for control of Cercospora leafspot. The disease level was too low to obtain valid information.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Effect of Spray Pressure and MasterLock on Cercospora (*Cercospora beticola*) Control
Parr, Brown City, MI - 2019

Trial Quality: Good
Variety: C - RR059
Planted: May 14
Harvested: Oct 18
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Loam
% OM: 4.4 **pH:** 6.8 **CEC:** 13.8
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Previous Crop: Corn

Rhizoc Level: Low
Cerc. Control: See trts.
Problems: Low disease level
Seeding Rate: 4.1 inches
Rainfall: 17.16 inches
Beets/100 ft: ~ 248

Application: JD 3520 tractor mounted plot sprayer, compressed air, 100 psi, 25 gpa

No.	Treatment	PSI	% Leaf Damage 8-Oct	Net $/A	RWSA	RWST	T/A	% SUC	% CJP
8	Triazole 8002XR + ML	80	**0.7**	**$2,064**	**11258**	**235**	**47.8**	**16.7**	**93.1**
4	Triazole 8002XR	80	**0.8**	**$2,049**	**11089**	**236**	**47.1**	**16.5**	**93.7**
5	Triazole 80015XR	100	**0.9**	**$2,060**	**11145**	**231**	**48.2**	**16.5**	**92.9**
9	Triazole 80015XR + ML	100	**0.9**	**$2,035**	**11109**	**229**	**48.5**	**16.4**	**92.8**
7	Triazole 8002XR + ML	60	**0.9**	**$2,074**	**11307**	**235**	**48.1**	**16.6**	**93.2**
3	Triazole 8002XR	60	**1.0**	**$2,063**	**11160**	**230**	**48.6**	**16.2**	**93.3**
6	Triazole 8002XR + ML	40	**1.1**	**$2,053**	**11201**	**231**	**48.6**	**16.3**	**93.3**
2	Triazole 8002XR	40	**1.1**	**$2,056**	**11124**	**233**	**47.8**	**16.6**	**92.9**
1	UTC		17.0	$1,833	9352	206	45.5	15.2	91.6
Average			2.72	$2,031.7	10971.9	229.6	47.80	16.34	92.98
LSD 5%			4.49	172.59	880.4	21.4	2.5	1.16	1.37
CV %			113.0	5.8	5.5	6.4	3.6	4.9	1.0

Spray Program for treatments 1-5
1st appl. - Proline (5.7 fl oz.) + EBDC*(1.6 qt.)
2nd appl. - Super Tin (8 fl oz.) + EBDC*(1.6 qt.)
3rd appl. - Priaxor (8 fl oz.) + EBDC*(1.6 qt.)
4th appl. - Super Tin (8 fl oz.) + EBDC*(1.6 qt.)
5th appl. - Inspire XT (7 fl oz.) + EBDC*(1.6 qt.)
6th appl. - EBDC*(1.6 qt.) + Copper*(2 pt.)

Spray Program for treatments 6-9
1st appl. - Proline (5.7 fl oz.) + EBDC*(1.6 qt.) + MasterLock (6.4 fl oz.)
2nd appl. - Super Tin (8 fl oz.) + EBDC*(1.6 qt.) + MasterLock (6.4 fl oz.)
3rd appl. - Priaxor (8 fl oz.) + EBDC*(1.6 qt.) + MasterLock (6.4 fl oz.)
4th appl. - Super Tin (8 fl oz.) + EBDC*(1.6 qt.) + MasterLock (6.4 fl oz.)
5th appl. - Inspire XT (7 fl oz.) + EBDC*(1.6 qt.) + MasterLock (6.4 fl oz.)
6th appl. - EBDC*(1.6 qt.) + Copper*(2 pt.) + MasterLock (6.4 fl oz.)

***EBDC = Manzate / Copper = Badge**

Comments: A Triazole / S Tin / Strobi / EBDC spray program was applied at 40, 60, 80 and 100 psi. The treatments were applied with and without MasterLock (sticker spreader). The Cercospora infestation level was low to moderate. All of the treatments provided good leafspot control. The leafspot level was not high enough to separate treatments. The trial was located in a good quality field and there were no outside influences that affected trial results. None of the treatments caused sugarbeet phytotoxicity.

Net $/A: Assume a $45 beet payment and trial average RWST with fungicide costs subtracted off.
Bold: Results are not statistically different from top-ranking treatment in each column.

Cercospora leaf spot: cultivar and fungicide program, Ridgetown, 2019

Ridgetown, Ontario, Canada
Cheryl Trueman & Kris McNaughton, University of Guelph, Ridgetown Campus, Ridgetown, ON

Trial Quality:	Very good	**Variety:**	B-1399, C-RR059, H-9908
Planted:	May 24	**Location:**	Ridgetown, Ontario, Canada
Harvested:	October 9	**Application Method:**	hand-held boom, CO_2 pressure
Plot Size:	2 rows x 23 feet	**Application Water Volume:**	25 gal/A except where indicated
Row Spacing:	2.5 feet	**Reps:**	4
Seeding Rate:	3.5 seeds/foot		

Highlights:

- Table 1:
  - All fungicide programs, with the exception of the Manzate Pro-stick program beginning at 50 DSV (low carrier volume) reduced AUDPS values compared to the non-treated control. The MSC 'tolerant' and 'susceptible' programs reduced AUDPS more than the Manzate Pro-Stick program beginning at 50 DSV (low carrier volume), but were similar to the other Manzate Pro-stick programs. Yield, sugar, and RWST values were comparable between the MSC programs and the Manzate Pro-stick programs. These results are similar to those identified in 2017 when we saw little advantage to the MSC programs over Manzate Pro-Stick programs.
  - The lowest number of fungicide applications were for the Manzate Pro-Stick beginning at 50 DSVs (high and low carrier volume). Among these, only the Manzate Pro-Stick program applied with the high carrier volume had a lower AUDPS value compared to the non-treated control, suggesting that the use of an appropriate water volume is beneficial with respect to disease control.
- Table 2: AUDPS differed between all three cultivars. Disease was greatest in C-RR059, followed by B-1399 and then H-9908 (C-RR059 > B-1399 > H-9908). Sugar was higher in C-RR059 than B-1399.

Acknowledgements: This project was funded in part through the Canadian Agricultural Partnership (the Partnership), a federal-provincial-territorial initiative. The Agricultural Adaptation Council assists in the delivery of the Partnership in Ontario. We also thank the Ontario Agri-Food Innovation Alliance, Ontario Sugarbeet Growers' Association (OSGA) and the Michigan Sugar Company (MSC) for financial support.

Table 1. Disease severity (% leaf area affected), area under the disease progress steps (AUDPS), yield, and sugar in three sugar beet cultivars grown under eight different fungicide schedules for management of Cercospora leaf spot (CLS), Ridgetown, ON, 2019.

Schedule (carrier volume) (# applications)	Severity (%) – Oct 2	AUDPS [a]	Yield (tons/acre)	Sugar (%)	RWST	RWSA
Unsprayed control	72 a	3424 a	22.0 a	15.7 a	215.0 a	4697 a
Manzate Pro-Stick, begin 50 DSV (12 gpa) (6)	55 ab	2336 ab	22.6 a	15.6 a	217.1 a	4866 a
Manzate Pro-Stick, begin 50 DSV (25 gpa) (6)	49 abc	**1939 bc**	23.4 a	15.8 a	221.4 a	5178 a
Manzate Pro-Stick, begin 40 DSV (25 gpa) (7)	50 abc	**2195 bc**	22.6 a	15.6 a	218.5 a	4903 a
Manzate Pro-Stick, begin 35 DSV (25 gpa) (7)	**42 bc**	**1745 bc**	24.1 a	15.7 a	217.7 a	5152 a
MSC 'tolerant cultivar' program (25 gpa) (7)	**39 c**	**1531 c**	24.7 a	15.6 a	219.0 a	5356 a
MSC 'moderate cultivar' program (25 gpa) (7)	**39 bc**	**1491 bc**	25.0 a	15.8 a	222.7 a	5498 a
MSC 'susceptible cultivar' program (25 gpa) (8)	**38 c**	**1482 c**	25.9 a	15.6 a	219.7 a	5615 a

[a] AUDPS = area under the disease progress stairs. A lower number is better.[b] Manzate Pro-Stick programs began at the BEETcast™ DSV threshold indicated and were applied approximately every 14 days. MSC Canada-adapted programs were as follows: 'tolerant' 1) Proline + Manzate Pro-Stick at 50 DSV, 2) Manzate Pro-Stick at 45 DSV or 21 days, 3) Proline + Manzate Pro-Stick at 35 DSV or 14 days, 4) Manzate Pro-Stick at 35 DSV or 14 days, 5+) Manzate Pro-Stick 21 DSV or 10 days, 'moderate' 1) Proline + Manzate Pro-Stick at 40 DSV, 2) Manzate Pro-Stick at 40 DSV or 18 days, 3) Proline + Manzate Pro-Stick at 25 DSV or 14 days, 4) Manzate Pro-Stick at 25 DSV or 14 days, 5+) Manzate Pro-Stick 18 DSV or 10 days, 'susceptible' 1) Proline + Manzate Pro-Stick at 35 DSV, 2) Manzate Pro-Stick at 35 DSV or 15 days, 3) Proline + Manzate Pro-Stick at 20 DSV or 12 days, 4) Manzate Pro-Stick at 20 DSV or 12 days, 5+) Manzate Pro-Stick 15 DSV or 10 days. For MSC Canada-adapted programs, where both DSV and number of days are listed, the fungicide was applied according to the criteria that was reached first. [c] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD. Data from different cultivars was pooled because of no significant schedule x cultivar interaction. All data in this table were transformed using a log transformation; data presented are the back transformed means for ease of interpretation.

Table 2. Area under the disease progress stairs (AUDPS), yield, and sugar in three sugar beet cultivars grown under eight different fungicide schedules for management of Cercospora leaf spot, Ridgetown, ON, 2019.

Cultivar	Severity (%) – Oct. 2 [a]	AUDPS [b]	Yield (tons/acre)	% Sugar	RWST	RWSA
B-1399	**50 a**	**2023 b**	24.1 a	**15.4 b**	214.5 a	5140 a
C-RR059	**60 a**	**2667 a**	23.9 a	**16.1 a**	220.7 a	5256 a
H-9908	**34 b**	**1344 c**	23.2 a	**15.6 ab**	221.3 a	5059 a

[a] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's adjustment. [b] AUDPS = area under the disease progress stairs. A lower number is better. All data in this table were transformed using a log transformation; data presented are the back transformed means for ease of interpretation. Data presented has been pooled from the three sugarbeet cultivars because there was no cultivar x schedule interaction.

Cercospora leaf spot: deposition aids and carrier volume, Ridgetown and Dealtown, 2019

Ridgetown and Dealtown, Ontario, Canada

Kendra Thornton and Cheryl Trueman, University of Guelph, Ridgetown Campus, Ridgetown, ON

Trial Quality:	Good (Ridgetown) Fair (Dealtown)	**Location:**	Ridgetown and Dealtown ON, Canada
		Application Method:	Hand-held boom, CO_2 pressure
Planted:	May 9 (Dealtown) May 25 (Ridgetown)	**Application Water Vol.:**	See table
		Reps:	4
Harvested:	September 18 (Dealtown) October 21 (Ridgetown)	**Plot Size:**	2 rows x 23 feet
		Row Spacing:	2.5 feet
Variety:	HIL-9908	**Seeding Rate:**	3.5 seeds/foot

Highlights:

- Harvest was earlier in Dealtown due to disease pressure by Rhizoctonia root rot.
- Programs including Manzate Pro-Stick had lower disease severity and higher sugar recovery and purity than those treated with Interlock or water alone. Adding Interlock to Manzate Pro-Stick did not reduce disease severity or improve sugar recovery or quality more than applications of Manzate Pro-Stick alone.
- Water volume did not affect disease severity, or improve sugar recovery and quality, with the exception of RWSA, where using 38 gpa resulted in higher recovered sugar than using 12 gpa.

Table 1. Cercospora leaf spot severity (% leaf area affected), standardized area under the disease progress stairs (sAUDPS), sugarbeets yield, and sugar percent in sugarbeet 'HIL-9908' managed using Manzate Pro-Stick fungicide with or without the deposition aid Interlock at different application carrier volumes.

Factor	Ridgetown Severity (%) Oct 15	Dealtown Severity (%) Sept 9	sAUDPS [a]	Yield (tons/acre)	Sugar (%)	RWST	RWSA
Program							
Water	55 a [b]	65 a	21.7 a	26.2 a	16.9 b	241 b	5414 b
Interlock	56 a	64 a	20.5 a	24.5 a	16.9 b	242 b	5432 b
Manzate Pro-Stick	22 b	42 b	11.3 b	24.3 a	17.7 a	258 a	6575 a
Manzate Pro-Stick + Interlock	23 b	39 b	10.8 b	23.9 a	17.7 a	257 a	6501 a
Carrier volume (gpa)							
12	39 a	54 a	16.8 a	24.1 a	17.1 a	246 a	5615 b
25	34 a	52 a	16.4 a	25.2 a	17.3 a	249 a	6056 ab
38	35 a	51 a	15.5 a	24.6 a	17.4 a	252 a	6179 a
50	34 a	52 a	15.7 a	25.1 a	17.3 a	251 a	6071 ab

[a] sAUDPS = standardized area under the disease progress stairs. A lower number is better. [b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's adjustment. Data pooled from two trials, except final severity ratings. Manzate Pro-Stick was applied at a rate of 2lbs/ac, and Interlock was applied at 0.136% v/v.

Acknowledgements: This project was funded in part through the Canadian Agricultural Partnership (the Partnership), a federal-provincial-territorial initiative. The Agricultural Adaptation Council assists in the delivery of the Partnership in Ontario. Project funding was also provided by the Ontario Agri-Food Innovation Alliance Research Program. We also thank the Ontario Sugarbeet Growers' Association (OSGA) and the Michigan Sugar Company (MSC) for financial support.

Cercospora leaf spot: fungicide efficacy, Ridgetown, 2019

Ridgetown, Ontario, Canada
Cheryl Trueman & Kris McNaughton, University of Guelph, Ridgetown Campus, Ridgetown, ON

Trial Quality:	Very good	**Variety:**	H-9908
Planted:	May 23	**Location:**	Ridgetown, Ontario, Canada
Harvested:	October 15	**Application Method:**	hand-held boom, CO_2 pressure
Plot Size:	2 rows x 23 feet	**Application Water Volume:**	32 gal/A
Row Spacing:	2.5 feet	**Reps:**	4
Seeding Rate:	3.5 seeds/foot		

Disease severity (% leaf area affected), area under the disease progress steps (AUDPS), yield, and sugar in sugarbeet grown under different fungicide schedules for management of Cercospora leaf spot, Ridgetown, ON, 2019.

Treatment Program (per ha) [a]	Severity (%) (Sept 30) [b]	AUDPS [c]	Yield (tons/ acre)	Sugar (%)	RWST	RWSA
Non-treated control	44 a	1895 a	28.7 c	15 a	210 a	6021 d
Proline @ 365 ml + Manzate Pro-stick @ 2.25 kg (A) Manzate Pro-stick @ 2.25 kg (C) Proline 365 ml + Manzate Pro-stick @ 2.25 kg (E) Manzate Pro-stick @ 2.25 kg (H) Manzate Pro-stick @ 2.25 kg (J, L, N, O)	**7 e**	**282 g**	**34.1 ab**	16 a	228 a	**7761 ab**
Manzate Pro-stick @ 2.25 kg (A,C,D,F,G,I,K,M,N,O)	**4 e**	**142 g**	**34.6 a**	16 a	236 a	**8156 a**
Milstop @ 5.6 kg (A,C,D,F,G,I,K,M,N,O)	**27 bc**	**1161 cd**	28.7 c	16 a	223 a	6402 cd
Phostrol @ 5.6 L (A,C,D,F,G,I,K,M,N,O)	**23 c**	**915 de**	30.6 abc	17 a	236 a	**7221 abc**
Cueva @ 1.5% v/v (A,C,D,F,G,I,K,M,N,O)	**27 bc**	**1101 cde**	31.0 abc	16 a	230 a	7145 a-d
Parasol WG @ 4.25 kg + Vegol @ 5.5 L (A,C,D,F,G,I,K,M,N,O)	**12 de**	**482 fg**	30.4 abc	17 a	237 a	**7198 abc**
Double Nickel @ 2.34 L (A,C,D,F,G,I,K,M,N,O)	36 ab	**1435 bc**	28.5 c	15 a	212 a	6054 cd
Cueva @ 1.5% v/v + Double Nickel @ 2.34 L (A,C,D,F,G,I,K,M,N,O)	**23 c**	**942 de**	30.9 abc	16 a	228 a	7035 a-d
Cueva @ 1.5% v/v + Phostrol @ 5.6 L (A,C,D,F,G,I,K,M,N,O)	**18 cd**	**769 ef**	29.9 bc	17 a	242 a	**7224 abc**
Oxidate 2.0 @ 1% v/v (A,C,D,F,G,I,K,M,N,O)	40 a	1718 ab	29.2 c	16 a	217 a	6317 cd
LX7 @ 800 ml (A,C,D,F,G,I,K,M,N,O)	40 a	1611 ab	29.2 c	17 a	230 a	6661 bcd

All disease severity data in this table was transformed using an arcsine square root transformation; data presented here are the back transformed means. [a] Treatments applied: A=June 29, B= July 9, C= July 18, D=July 26, E=August 1, F=August 2, G=August 12, H=August 15, I=August 20, J=August 23, K=August 28, L=September 3, M=September 6, N=September 14, O=September 24. [b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's adjustment. [c] AUDPS = area under the disease progress stairs. A lower number is better.

Funding: Ontario Agri-Food Innovation Alliance.

Cercospora leaf spot: fungicide efficacy, Ridgetown, 2019

Ridgetown, Ontario, Canada
Cheryl Trueman & Kris McNaughton, University of Guelph, Ridgetown Campus, Ridgetown, ON

Trial Quality:	Very good	**Variety:**	H-9908
Planted:	May 23	**Location:**	Ridgetown, Ontario, Canada
Harvested:	No harvest	**Application Method:**	hand-held boom, CO_2 pressure
Plot Size:	2 rows x 23 feet	**Application Water Volume:**	32 gal/A
Row Spacing:	2.5 feet	**Reps:**	4
Seeding Rate:	3.5 seeds/foot		

Highlights/Summary:

- No Dissolvine or Bortrac treatment decreased Cercospora leaf spot injury compared to the non-treated control.
- The inclusion of the adjuvant Sylgard 309 with Dissolvine, particularly at higher Dissolvine rates, appeared to increase sugarbeet leaf burn injury.
- While soil boron levels were identified as being very low, repeated foliar applications of Bortrac did not alter tissue boron levels in those treatments compared to the non-treated control.

Disease severity (% leaf area affected), area under the disease progress steps (AUDPS), boron and iron leaf content ten days after the last application in sugarbeet grown under iron and boron treatment schedules for management of Cercospora leaf spot, Ridgetown, ON, 2019.

	Treatment Program (per ha) [a]	Disease Severity (%) [b] Sept 30	AUDPS [c]	Leaf Boron (mg/kg)	Leaf Iron (mg/kg)
1	Non-treated control	21 a	881 a	51.8 a	93.8 a
2	EDTA @ 7.77 kg + Sylgard 309 @ 150 ml (CDEFG)	25 a	1034 a	52.0 a	104.0 a
3	Dissolvine[b] @ 0.75 kg + Sylard 309 @ 150 ml (CDEFG)	22 a	897 a	54.0 a	104.5 a
4	Dissolvine @ 1.5 kg + Sylard 309 @ 150 ml (CDEFG)	22 a	860 a	52.0 a	115.0 a
5	Dissolvine @ 2.0 kg + Sylard 309 @ 150 ml (CDEFG)	22 a	915 a	52.8 a	125.0 a
6	Bortrac @ 3.0 L (AB)	24 a	1032 a	55.0 a	177.5 a
7	Bortrac @ 3.5 L (AB)	18 a	742 a	54.5 a	100.3 a
8	Bortrac @ 4.0 L (AB)	21 a	879 a	56.5 a	101.0 a
9	Bortrac @ 3.0 L (AB) Dissolvine @ 0.75 kg + Sylgard 309 @ 150 ml (CDEFG)	16 a	642 a	55.0 a	110.0 a
10	Bortrac @ 3.5 L (AB) Dissolvine @ 1.5 kg + Sylgard 309 @ 150 ml (CDEFG)	22 a	1007 a	55.8 a	130.0 a
11	Bortrac @ 4.0 L (AB) Dissolvine @ 2.0 kg + Sylgard 309 @ 150 ml (CDEFG)	19 a	773 a	57.3 a	132.5 a

[a] Treatments applied: A=June 21 (4-6 leaf stage), B= July 5, C= July 9 (50 DSV accumulated), D=July 24, E=August 6, F=August 20, G=September 3 [b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's adjustment. [c] AUDPS = area under the disease progress stairs. A lower number is better.

Funding: Ontario Agri-Food Innovation Alliance.

Canopy coverage: deposition aids and fungicide, Ridgetown, 2019

Ridgetown, Ontario, Canada
Kendra Thornton and Cheryl Trueman, University of Guelph, Ridgetown Campus, Ridgetown, ON
Jason Deveau, Ontario Ministry of Agriculture, Food, and Rural Affairs, Simcoe, ON

Trial Quality:	Very good	**Variety:**	C-RR059
Planted:	May 25	**Location:**	Ridgetown, Ontario, Canada
Application:	July 23 (trial 1), August 2 (trial 2)	**Application Method:**	hand-held boom, CO_2 pressure
		Application Water Volume:	12 gpa
Plot Size:	2 rows x 46 feet	**Reps:**	4
Row Spacing:	2.5 feet		
Seeding Rate:	3.5 seeds/foot		

Highlights:

- Two trials were completed. Program applications took place once plants reached the 12 to 16 leaf stage. Rhodamine WT dye was added to spray mixtures to assess canopy coverage by measuring dye recovery using fluorimetry.
- Adding Interlock to the spray mix did not improve the canopy coverage or penetration of Manzate Pro-Stick.
- The lowest coverage was found in the inner and outer canopy from the base of the leaf. Adding Interlock did not affect dye recovery for any canopy location.

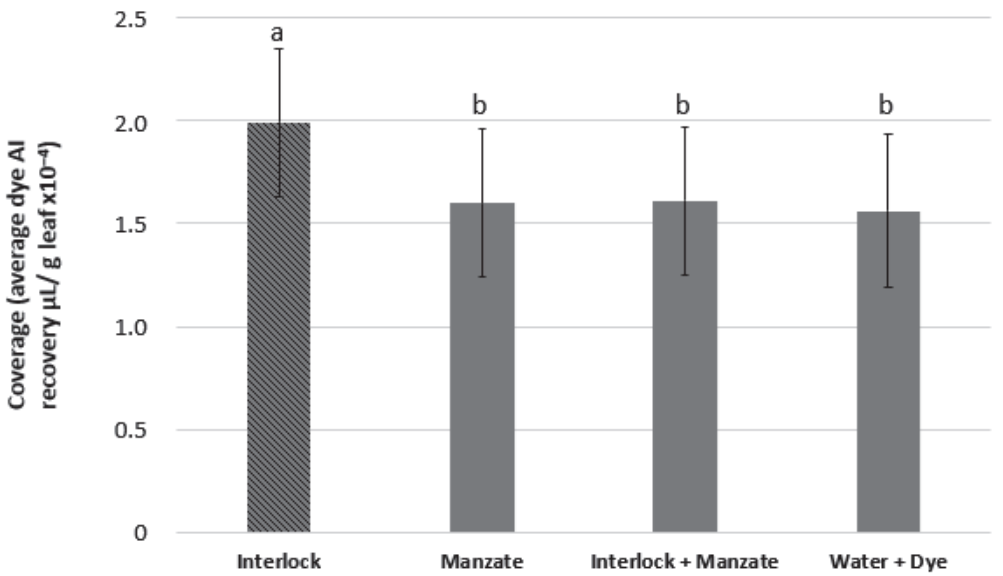

Figure 1: Effect of treatment on dye recovery (average µL active ingredient per gram of dry leaf weight). Results from two trials. Bars followed by the same letter are not significantly different at $p \leq 0.05$, Tukey's HSD. Darkened bars are significantly different from light gray bars. Error bars represent standard error of the mean.

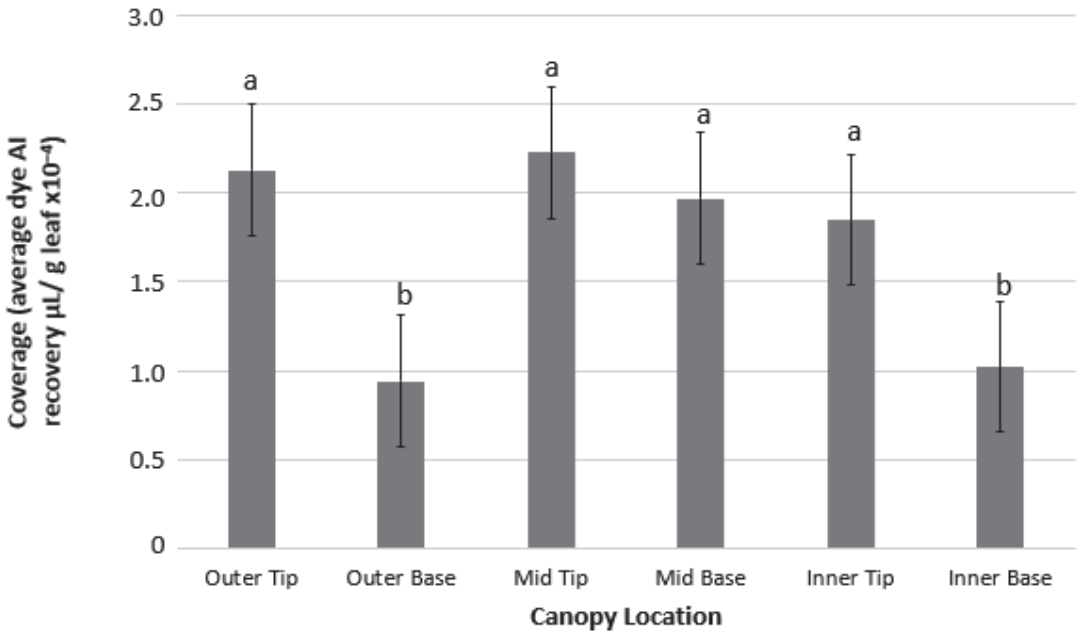

Figure 2: Effect of canopy location on dye recovery (average µL active ingredient per gram of dry leaf weight). Results from two trials. Bars followed by the same letter are not significantly different at $p \leq 0.05$, Tukey's HSD. Error bars represent standard error of the mean.

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Canopy coverage: deposition aids and nozzle type, Ridgetown, 2019

Ridgetown, Ontario, Canada
Kendra Thornton and Cheryl Trueman, University of Guelph, Ridgetown Campus, Ridgetown, ON
Jason Deveau, Ontario Ministry of Agriculture, Food, and Rural Affairs, Simcoe, ON

Trial Quality:	Very good	**Variety:**	C-RR059
Planted:	June 7	**Location:**	Ridgetown, Ontario, Canada
Application:	August 12	**Application Method:**	hand-held boom, CO_2 pressure
Plot Size:	2 rows x 46 feet	**Application Water Volume:**	12 gpa
Row Spacing:	2.5 feet	**Reps:**	4
Seeding Rate:	3.5 seeds/foot		

Highlights:

- Adding Interlock to the spray mix did not alter coverage of any nozzle type (Hardi ISO injet air inclusion, Teejet XR110, and Teejet AI3070) tested. The Teejet AI3070 air inclusion nozzle provided the lowest amount of canopy coverage.
- Coverage at the mid canopy from the tip of the leaf was higher than the outer and inner canopy from the base of the leaf.

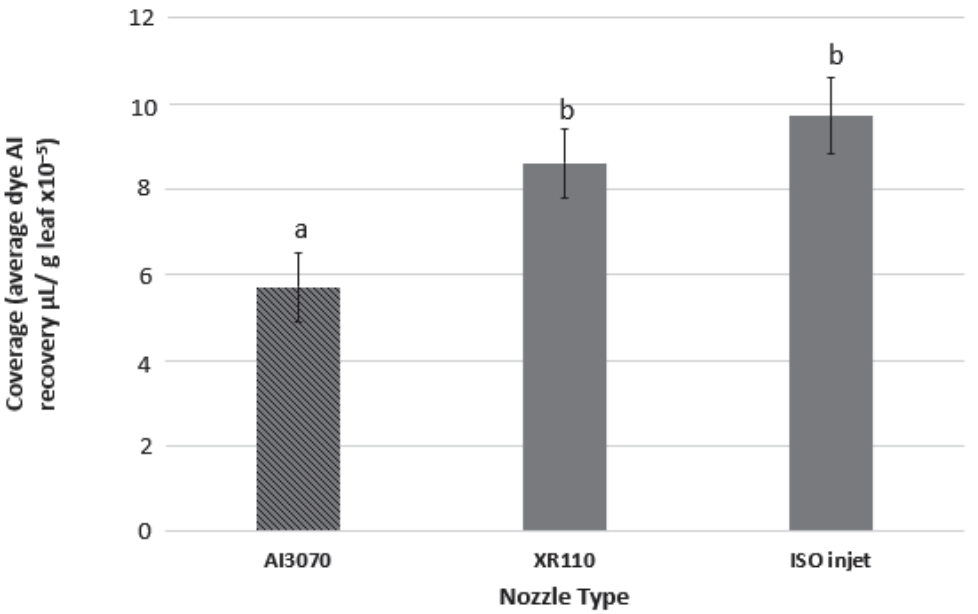

Figure 1: Effect of nozzle type on dye recovery (average µL active ingredient per gram of dry leaf weight). Bars followed by the same letter are not significantly different at $p \leq 0.05$, Tukey's HSD. Darkened bar is significantly different than light gray bars. Error bars represent standard error of the mean.

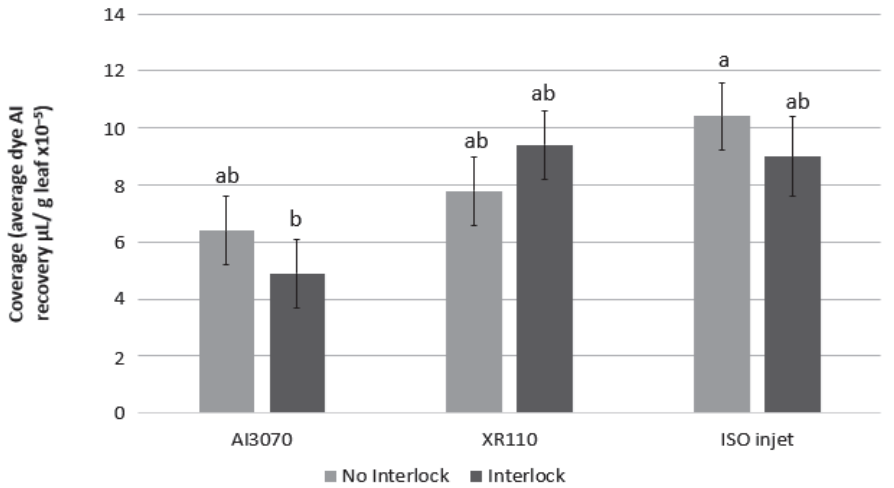

Figure 2: Effect of treatment on dye recovery (average µL active ingredient per gram of dry leaf weight). Bars followed by the same letter are not significantly different at $p \leq 0.05$, Tukey's HSD. Error bars represent standard error of the mean.

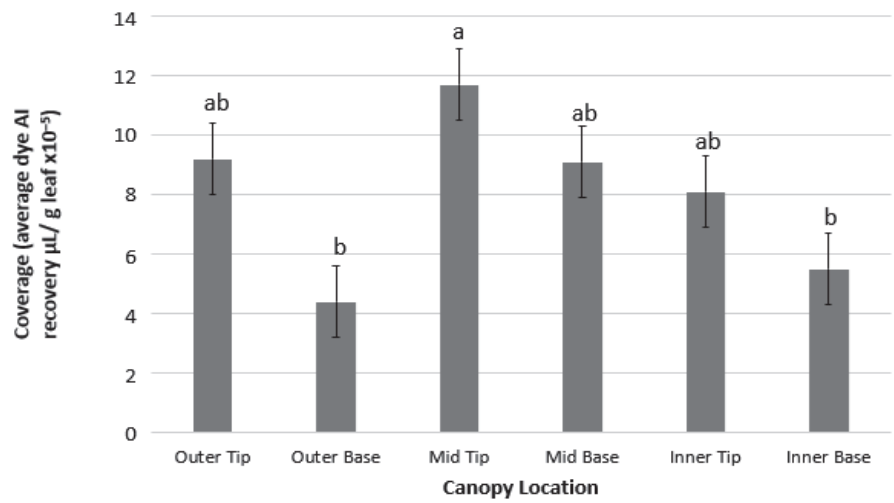

Figure 3: Effect of canopy location on dye recovery (average µL active ingredient per gram dry leaf weight). Bars followed by the same letter are not significantly different at $p \leq 0.05$, Tukey's HSD. Error bars represent standard error of the mean.

Acknowledgements: This project was funded in part through the Canadian Agricultural Partnership (the Partnership), a federal-provincial-territorial initiative. The Agricultural Adaptation Council assists in the delivery of the Partnership in Ontario. Project funding was also provided by the Ontario Agri-Food Innovation Alliance Research Program. We also thank the Ontario Sugarbeet Growers' Association (OSGA) and the Michigan Sugar Company (MSC) for financial support.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Evaluation of foliar fungicide treatments to manage Cercospora leaf spot of sugar beet

Chris Bloomingdale and Jaime Willbur, Michigan State University

Location: Frankenmuth (SVREC)	**Treatment Timings:** 14 day interval starting at 35 DSV
Planting Dates: April 24, 2019	**Pesticides:** see table
Soil Type: Loam	**O.M.:** 5.0 **pH:** 7.5
Replicates: 4	**Variety:** C-G333NT

Summary: CLS pressure was strong at this location, and differences were detected among treatments. Disease severity ratings from 11 Sep were significantly different among treatments (P<0.0001). All programs, with the exception of 37, had significantly lower disease than program 1 (control). Programs 3, 4, 7, 8, 9, 10, 35, and 36 were the only treatments by the end of season with a severity below 6, which is considered the threshold for economic loss. Significant differences were detected among mean yield values of the programs (P<0.0001). All programs except for 31 and 37 yielded significantly higher than the control, which had a mean yield of 13.6 t/A. Numerically, the highest yield was obtained by program 4 (23.3 t/A), which performed similarly to 12 other programs. Percent sugar and RWST differed significantly among programs (P<0.0001); in general, the range of values was comparable to commercially harvested sugar beets.

Table 1. End of season disease severity and yield parameters from the tested fungicide programs.

No.	Treatment, Rate[a], and Timing[b]	Disease Severity[c,d]	Yield (t/A)	Sugar (%)	RWST[e]
8	Manzate Max (1.6 qt) ABCDEF + Proline (5.7 fl oz) B + Topsin (20 fl oz) B + Super Tin (8 fl oz) CE + Delaro (11 fl oz) D + Proline (1.71 fl oz) D + Propulse (13.6 fl oz) F	4.3 n	20.5 b-j	18.2 b-f	260.1 a-c
10	Manzate Max (1.6 qt) ABCDEF + Delaro (11 fl oz) B + Proline (1.71 fl oz) B + Super Tin (8 fl oz) CE + Proline (5.7 fl oz) D + Topsin (20 fl oz) D + Flint Extra (3.6 fl oz) F	4.3 n	23.0 a-c	18.3 b-e	250.4 a-e
3	Exp[f] 1 (2 lb) ABCDEF	5.0 mn	22.8 ab	18.9 bc	250.7 a-e
9	Manzate Max (1.6 qt) ABCDEF + Propulse (13.6 fl oz) B + Super Tin (8 fl oz) CE + Delaro (11 fl oz) D + Proline (1.71 fl oz) D + Topsin (20 fl oz) F + Proline (5.7 fl oz) F	5.0 mn	22.4 a-e	19.2 b	255.1 a-e
4	Proline (5.1 fl oz) ABCDEF + Manzate Max (1.6 qt) ABCDEF	5.3 lm	23.3 a	18.5 bd	277.4 a-d
7	Topsin (20 fl oz) A + Exp 1 (2 lb) AE + Dexter Max (2.1 lb) BD + Super Tin (8 fl oz) CF + Manzate Max (1.6 qt) CF	5.3 lm	22.8 ab	18.4 b-d	248.3 a-e
35	Manzate Max (1.6 qt) ABDF + Exp 4 (7 fl oz) BD + Priaxor (8 fl oz) BF + Serifel (4 oz) CE + Super Tin (8 fl oz) CE + Topsin (20 fl oz) D	5.3 lm	22.5 a-e	18.5 b-d	269.4 a-c
36	Manzate Max (1.6 qt) ABDF + Exp 4 (7 fl oz) BD + Priaxor (8 fl oz) BF + Super Tin (8 fl oz) CE + Topsin (20 fl oz) D	5.5 k-m	21.3 a-g	19.0 ab	256.8 a-e
2	Inspire XT (7 fl oz) AC + Manzate Max (1.6 qt) ABCDEF + Super Tin (8 fl oz) BD	6.0 j-l	21.2 a-g	19.0 ab	265.4 a-c
5	Super Tin (8 fl oz) ACE + Manzate Max (1.6 qt) ACE + Exp 1 (2 lb) BDF	6.0 j-l	21.5 a-f	19.0 ab	285.7 a
28	Koverall (2 lb) ABCEF + Topguard (14 fl oz) BD + Super Tin (8 fl oz) CE + Badge SC (2 pt) D	6.0 j-l	21.4 a-g	18.9 ab	272.9 a-g
19	Proline (5.7 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	6.3 i-k	20.7 b-j	18.9 ab	263.1 a-c
27	Koverall (2 lb) ABCEF + Topguard (14 fl oz) B + Super Tin (8 fl oz) CE + Lucento (5.5 fl oz) + Badge SC (2 pt) D	6.3 i-k	21.9 a-d	18.6 b-d	253.5 a-e
42	Headline (12 fl oz) ACE + Manzate Max (1.6 qt) ABCDEF	6.3 i-k	20.8 b-j	18.4 b-d	238.8 c-h
25	Koverall (2 lb) ABCEF + Lucento (5.5 fl oz) B + Super Tin (8 fl oz) CE + Topguard (14 fl oz) D	6.5 h-j	22.2 a-d	18.9 bc	257.2 a-c

29	Koverall (2 lb) ABCEF + Lucento (5.5 fl oz) B + Super Tin (8 fl oz) CE + Badge (2 pt) C + Proline (5 fl oz) D	6.5 h-j	21.5 a-f	18.5 b-d	277.2 a-d
30	Koverall (2 lb) ABCEF + Topguard (14 fl oz) B + Super Tin (8 fl oz) CE + Badge (2 pt) C + Proline (5 fl oz) D	6.5 h-j	20.2 d-k	18.8 bc	267.1 a-c
33	ManKocide (4.3 lb) ABCDEF	6.5 h-j	18.3 i-l	18.1 a-f	235.7 c-h
34	Double Nickel 55 (0.5 lb) ABCDEF + ManKocide (4.3 lb) ABCDEF	6.5 h-j	18.1 k-m	18.6 b-d	253.2 a-e
6	Inspire XT (7 fl oz) A + Manzate Max (1.6 qt) ACE + Dexter Max (2.1 lb) BD + Super Tin (8 fl oz) CE + Cuprofix Ultra 40 (48 oz) F	6.8 g-j	19.4 f-k	19.0 ab	264.6 a-c
14	Brixen (21 fl oz) AD + Minerva Duo (16 fl oz) BE + Super Tin (8 fl oz) CF + Koverall (1.5 lb) CF	6.8 g-j	20.4 d-j	18.1 b-f	264.5 a-c
17	Minerva (13 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	6.8 g-j	18.8 j-l	18.3 b-e	251.1 a-e
18	Inspire XT (7 fl oz) A + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	6.8 g-j	20.3 d-k	18.6 b-d	259.0 a-c
26	Koverall (2 lb) ABCEF + Lucento (5.5 fl oz) BD + Super Tin (8 fl oz) CE + Badge SC (2 pt/a) D	6.8 g-j	22.0 a-d	18.8 bc	263.2 a-c
11	Brixen (21 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	7.0 f-i	20.4 d-k	18.9 ab	267.7 a-c
15	Minerva Duo (16 fl oz) ACDF + Inspire XT (7 fl oz) BE +	7.0 f-i	18.7 j-l	18.1 b-f	258.3 a-c
16	Minerva Duo (16 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Inspire XT (7 fl oz) CF	7.0 f-i	18.6 j-l	18.1 a-f	232.0 c-i
22	Badge SC (1.5 pt) ABCDEF + Manzate Max (1.6 qt) ABCDEF	7.0 f-i	19.1 g-k	18.1 b-f	216.6 e-i
24	Manzate Max (1.6 qt) AD + Super Tin (8 fl oz) B + Badge SC (1.5 pt) BCDE + Eminent (13 fl oz) C + Topguard (14 fl oz) E + Badge SC (2 pt) F	7.3 e-h	18.6 j-l	18.8 bc	273.2 a-f
32	LifeGard WG (4.5 oz/100gal) ABCDEF + Inspire XT (7 fl oz) AC + Super Tin (8 fl oz) BD	7.3 e-h	18.7 j-l	18.2 b-e	248.5 a-e
12	Exp 2 (32 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	7.5 e-g	19.3 f-k	17.8 c-f	243.9 c-g
20	Exp 3 (8 fl oz) AD + Super Tin (8 fl oz) BE + Koverall (1.5 lb) BE + Minerva Duo (16 fl oz) CF	7.5 e-g	20.8 b-j	18.2 b-f	245.1 c-g
23	Manzate Max (1.6 qt) AC + Eminent (13 fl oz) B + Badge SC (1.5 pt) BCDE + Super Tin (8 fl oz) D + Proline (5.7 fl oz) E + Badge SC (2 pt) F	7.5 e-g	20.4 d-j	18.6 b-d	253.4 a-e
13	Super Tin (8 fl oz) AD + Koverall (1.5 lb) BE + Exp 2 (32 fl oz) BE + Minerva Duo (16 fl oz) CF	7.8 d-f	18.4 h-l	17.6 d-f	231.5 c-i
38	Inspire XT (7 fl oz) AC + Stargus (1 qt) ABCDEF + Super Tin (8 fl oz) BD	7.8 d-f	19.3 f-k	18.5 b-d	232.7 c-i
40	Headline (12 fl oz) ACE + Manzate Max (1.6 qt) BDF	8.0 c-e	19.4 f-k	17.3 e-g	237.1 c-h
41	Manzate Max (1.6 qt) ABDF + Headline (12 fl oz) CE	8.0 c-e	19.9 d-k	17.9 a-f	227.9 b-i
21	Badge SC (2 pt) ABCDEF	8.5 b-d	16.7 l-n	17.6 d-f	246.1 a-e
39	Regalia (1 qt) ABCDEF + Badge SC (2 pt) ABCDEF	8.5 b-d	16.7 l-n	17.1 fg	237.7 c-h
31	LifeGard WG (4.5 oz/100gal) ABCDEF	8.8 bc	15.7 m-o	16.2 gh	198.9 hi
37	Stargus (2 qt) ABCDEF	9.0 ab	14.5 no	15.4 h	200.3 hi
1	Non-Treated Control	9.8 a	13.6 o	15.2 h	194.5 i

[a] All rates, unless otherwise specified, are listed as a measure of product per acre. MasterLock was added to all tank mixes at a rate of 0.25 % v/v.

[b] Application letters code for the following dates: A=26 Jun, B=8 Jul, C=22 Jul, D=31 Jul, E=14 Aug, F=23 Aug.

[c] Disease severity based on a 0-10 scale with the following breakdown of leaf area: 1=0.1% (1-5 spots/leaf), 2=0.35% (6-12 spots/leaf), 3=0.75% (13-25 spots/leaf), 4=1.5% (26-50 spots/leaf), 5=2.5% (51-75 spots/leaf), 6=3%, 7=6%, 8=12% 9=25%, 10=50%.

[d] Column values followed by the same letter were not significantly different based on Fisher's Protected LSD (α=0.05); if no letter, then the effect was not significant.

[e] Pounds of recoverable white sugar per ton of beets.

[f] Exp=experimental compound.

MICHIGAN STATE UNIVERSITY EXTENSION

Project GREEEN

Epidemiological studies of Cercospora leaf spot of sugar beet for improved management

Alexandra Hernandez[1], Noah Rosenzweig[1], Linda E. Hanson[1,2], Daniel Bublitz[1], and Jaime F. Willbur[1]; [1]Michigan State University, Department of Plant, Soil and Microbial Sciences; [2]United States Department of Agriculture – Agricultural Research Service

Background: Cercospora leaf spot (CLS), caused by *Cercospora beticola*, is the most important foliar disease of sugar beets in Michigan (Harveson et al. 2009; Lartey et al. 2010). Increased inoculum due to overwintering has posed a larger problem when managing fields with high disease pressure. In recent years, BEETcast thresholds advising the initial spray occurred around the time spots were forming. Since CLS lesions were observed 7 to 10 days *after* infection, and are difficult to manage once the initial infection has taken place, these recommendations were delayed. Therefore, accurate prediction of the initial infection, based on a better understanding of *C. beticola* spore presence and abundance, is crucial. Short-term and long-term management methods are required for sustainable management of CLS. In this research, strategies were investigated to improve prediction models, reduce inoculum survival, and manage fungicide resistance development.

Methods:

Objective 1. Monitored *C. beticola* spore presence and abundance using spore traps and sentinel beets and used this information to refine existing predictive modeling tools. Environmental factors, such as temperature, humidity, leaf wetness, and soil conditions were monitored using on-site or MSU Enviroweather stations and were tested for correlations to spore abundance. Stepwise regression analyses were conducted to assess the accuracy of the model variables separately and together. R-squared values were used to evaluate each variable and variable combination and a preliminary weather-based model predicting spore abundance was determined.

Objective 2. Assessed potential management strategies, targeting in-season and end-of-season treatments, with the aim to reduce inoculum levels, and therefore disease. Treatments included a nontreated control, plowing immediately post-harvest, burning prior to defoliation at-harvest, and applying a desiccant (saflufenacil) seven days pre-harvest. Four replicates of each treatment were included in a randomized complete block design (RCBD). Four leaf samples were collected from each plot: one sample was collected at harvest for destructive sampling and three samples were placed in mesh bags and left in the field to be evaluated 45, 90, and 135 days post-harvest. Samples were processed by counting the number of CLS lesions, then placed in moist chambers for three days. Leaves were then re-assessed for percentage of sporulating lesions. Fifteen representative lesions from each treatment replicate were surface disinfested and plated on clarified V8 juice or water agar media to detect viable *C. beticola*.

Objective 3. Determined fungicide sensitivity of *C. beticola* populations recovered from resistance management tactic efficacy trials. Treatment programs were evaluated at the SVREC included: 1) a nontreated control; 2) a mixed application, where both high-risk (Headline; pyraclostrobin) and low-risk (Manzate Max; mancozeb) fungicides were applied at each spray timing; 3) high-low, where alternate sprays of pyraclostrobin and mancozeb were applied, with pyraclostrobin sprayed first; and 4) low-high, which is similar to the previous treatment but with low-risk applied first. Treatments were replicated four times and arranged in a RCBD. Leaves with symptoms of CLS were sampled from field trials mid-season in July (after three treatments) and end-of-season in September (after all six treatments). Mono-conidial *C. beticola* isolates were then tested for *in vitro* pyraclostrobin sensitivity. A spiral gradient dilution method was used to find the effective concentration inhibiting growth by 50% (EC_{50}) for at least 15 isolates per treatment replicate.

For all objectives, statistical analyses (analysis of variance and simple and mixed linear regression) were conducted in SAS v. 9.4 and evaluated at the α=0.05 significance level. Fisher's protected Least Significance Difference was used for mean comparisons.

Results & Conclusions:

Objective 1: The abundance of spores was not significantly correlated with the number of spots on the sentinel beets for the corresponding week ($P > 0.05$). However, sentinel beet studies were generally comparable to spore traps in the initial spore detections. The strongest correlations to spore count were with wind speed ($r = 0.38$, $P < 0.0001$), minimum relative humidity ($r = 0.24$, $P < 0.01$), maximum soil temperature ($r = -0.24$, $P < 0.01$), and precipitation ($r = 0.22$, $P < 0.05$). The model with the best fit included all variables stated above ($R^2 = 0.23$, $P < 0.0001$). The model proposed for spore number is: $CB = 9.53 * PC + 0.70 * RH_{min} - 1.21 * ST_{max} + 2.43 * WS_{max}$, where *CB* is daily *C. beticola* spore abundance, *PC* is daily total precipitation (in), RH_{min} is minimum daily relative humidity, ST_{max} is maximum daily soil temperature (°F), and *WS* is maximum daily wind speed (mph).

Initial detections and general trends of abundance were identified using both mechanical spore trap and sentinel beet methods. A preliminary spore abundance model was determined and will be further validated to improve existing prediction tools.

Objective 2: For samples collected at harvest (N=133 leaves and 240 lesions), significant treatment differences were detected in percentages of lesion sporulation (Fig. 1A, $P < 0.001$). Treatment also significantly affected percentages of lesion viability (Fig. 1B, $P < 0.05$). Remaining leaf samples from inoculum overwintering studies will continue to be evaluated as described 45, 90, and 135 days post-harvest.

Novel management strategies, particularly the use of a foliar burner at-harvest, have the potential to significantly reduce inoculum overwintering and aid in long-term CLS control. In 2020, early-season spore presence and abundance, weekly disease ratings, and final yield and sugar data will be collected to assess the long-term efficacy of inoculum reduction strategies.

Objective 3: No significant differences were found in mean EC_{50} values for isolates treated with pyraclostrobin in any of the fungicide treatment programs for mid-season samples taken in July ($P > 0.05$). These samples did not receive the entire fungicide program; the remaining full-season treatment samples will be processed. All programs resulted in similar yields ($P < 0.001$) and relative area under the disease progress curves (RAUDPC; $P < 0.01$) and performed better than the non-treated control (Table 1.).

All isolates tested were sensitive to pyraclostrobin concentrations below label rates (1,200-1,500µg ml^{-1}) (Fig. 2). Resistance management tactics were found to have little effect on mid-season populations of *C. beticola*. Testing of end-of-season *C. beticola* populations is in progress and will continue.

Table 1. Mean yield and RAUDPC value for fungicide resistance management programs.

Treatment	Description	Yield (T/A)		RAUDPC[w] (%)	
1	Control	13.6	b[x]	39.9	a
2	Headline + Manzate Max ABCDEF	20.8	a	22.3	b
3	Headline[y] ACE[z] + Manzate Max BDF	19.4	a	27.4	b
4	Manzate Max ACE + Headline BDF	19.9	a	25.3	b

[w] Area under the disease progress curve (AUDPC) was determined from four disease severity ratings (25 Jul, 6 Aug, 19 Aug, 11 Sep) with a 0 to 10 scale. Relative AUDPC (RAUDPC) was calculated by dividing the mean for each treatment by the maximum possible AUDCP.

[x] Column values followed by the same letter were not significantly different based on Fisher's Protected LSD (α=0.05); if no letter, then the effect was not significant

[y] Headline was applied at 12 fl oz/A and Manzate Max was applied at 1.6 qt/A. MasterLock was added to all tank mixes at a rate of 0.25 % v/v.

[z] Application letters code for the following dates: A=26 Jun, B=8 Jul, C=22 Jul, D=31 Jul, E=14 Aug, F=23 Aug.

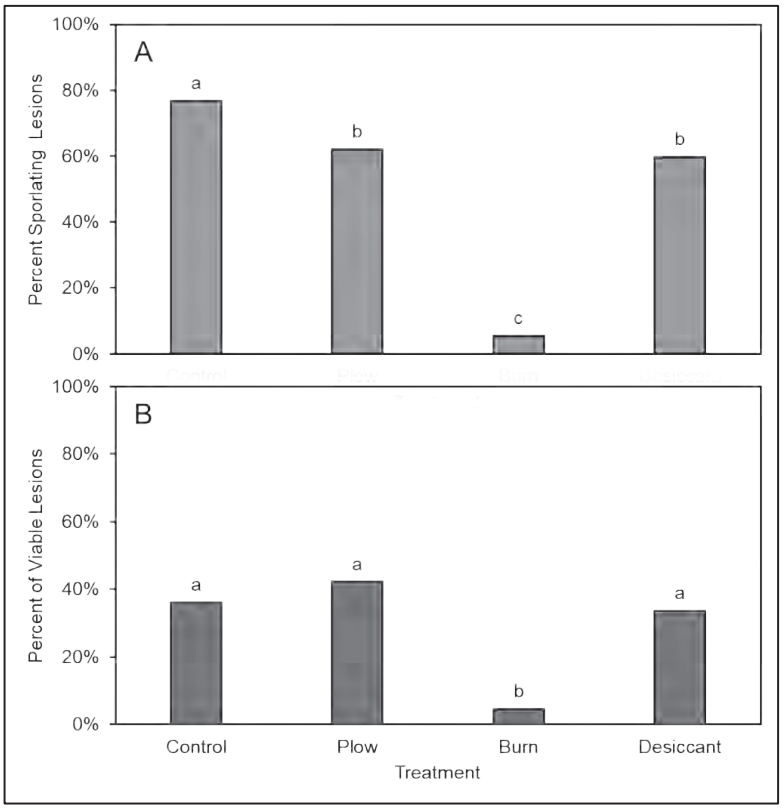

Figure 1. Significant treatment differences were detected in percentages of **A,** lesion sporulation ($P < 0.001$) and **B,** lesion viability ($P < 0.05$) from samples collected at-harvest (N=133 leaves or 240 lesions). The desiccant, burn, and plow treatments were applied seven days pre-harvest, prior to defoliation at harvest, and immediately post-harvest, respectively. Means comparisons were determined using Fisher's protected Least Significance Difference; bars with the same letter are not significantly different α=0.05.

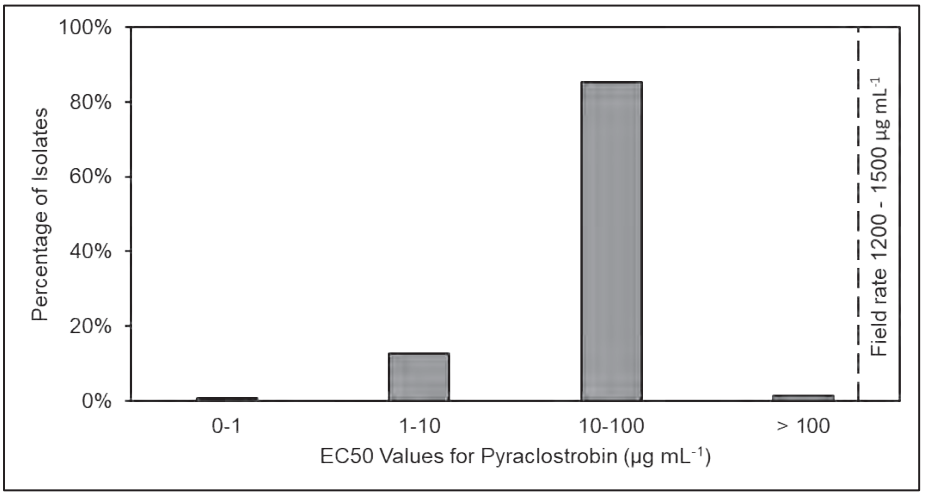

Figure 2. Frequency distribution of mean values of the effective concentration of pyraclostrobin inhibiting *Cercospora beticola* isolate growth by 50% (EC_{50}) from mid-season samples collected in July. Mid-season samples were subjected to three of six total fungicide applications for each treatment [nontreated control, mixed low-risk (mancozeb) and high-risk (pyraclostrobin) products, alternated low-high, and alternated high-low].

Sugarbeet (*Beta vulgaris*) **Cercospora leaf spot**; *Cercospora beticola*

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In-vitro fungicide sensitivity of *Cercospora beticola* isolates from sugarbeet 2019

Cercospora leaf spot (CLS) caused by *Cercospora beticola* is the most serious foliar disease of sugarbeet in Michigan and when conditions are conducive can cause yield losses. The need to preserve the usefulness of existing fungicide chemistries has been particularly important since the development of fungicide insensitivity issues in CLS. Additionally, from 2013-2018, there has been a steady increase in frequency of *C. beticola* isolates with triazole and QoI resistance collected from commercial production fields in Michigan and Ontario, CA. Major issues have developed over the past few years with the introduction of effective fungicides for control of this disease related to fungice application timing and development of insensitivity to established and novel fungicides in *C. beticola* populations. This has led to the increase in the development of insensitivity to some fungicides previously recommended for CLS management, most notably thiophanate-methyl, benzimidazoles and QoIs. Therefore, this project continued to monitor fungicide sensitivity of pathogen populations to inform the development of resistant management and fungicide use recommendations.

Sample collection and geographical origin of isolates: Isolates of *C. beticola* were collected from leaves with symptoms of CLS sampled from sugarbeet fields in east-central Michigan during Sep and Oct in 2019. Samples of up to 20 leaves from throughout a selection of sugarbeet production fields in Michigan and Ontario CA were used in sensitivity testing. Isolates of *C. beticola* were recovered from infected leaf tissue from multiple field locations using established methods. Pure cultures isolated from individual CLS lesions were obtained to determine sensitivity to each fungicide described below. Representative lesions were randomly selected from sugarbeet leaves, surfaced sterilized, and placed into plastic bags with moist paper towel to maintain humidity near 100 %, and placed under fluorescent light with an 8-h photo-period at 24°C for 7 d to promote sporulation. Hyphal tipping was used to isolate pure cultures of *C. beticola* onto clarified V8 (CV8) media amended with $CaCO_3$ (900 ml of distilled H_2O, 100 ml of CV8, 15 g of Bacto Agar, and 1.5 g of $CaCO_3$) for subsequent fungicide sensitivity assays.

In vitro fungicide sensitivity of *Cercospora beticola* by dilution gradient: Difenoconazole [DFZ; Inspire®, (Group 3)], fenbuconazloe [FBZ; Enable®, (Group 3)], flutriafol [FTL; Topguard®, (Group 3)], prothioconazole [PTZ; Proline®, (Group 3)], tetraconazole [TTZ; Eminent®125 SL, (Group 3)], pyraclostrobin [PYR; Headline® 2.08SC, (Group 11)], thiophanate-methyl [TPN; Topsin® 4.5FL (Group 1)] and triphenyltin OH [TPT; Super Tin® 80WP (Group 30)] and stock solutions of 10,000 mg/liter of each fungicide were prepared by dissolving commercial-grade fungicides in a sterile solvent. 50 ml of CV8 agar was poured into each dish, to form a layer of CV8 agar with a constant volume, thus when a stock solution is added to the agar, it results in a gradient from 0 to 1000 mg/liter across the agar surface. A method using a spiral gradient plater was used to determine effective concentration in inhibiting growth by 50% (EC_{50}). Pure cultures of *C. beticola* were prepared as described above. Conidial suspensions were prepared by flooding colony Petri dishes with 1 mL distilled water and scraping the conidia free from the surface with a rubber policeman. The conidial suspension (10 µL) was spread across the fungicide gradient plate from edge to center. Isolates were incubated for 14 d, at 24°C (two replications). The point coordinates at which the colonies start and end was recorded and entered into a software program, which calculates the EC_{50} for each isolate for each of the fungicides.

Results

The mean EC_{50} values were estimated for each of the fungicides listed above. In 2018 a total of 107, 107, 99, 107, 107, 107, 99 and 107 isolates were screened against the fungicides DFZ, FBZ, FTL, PTZ, TTZ, PYR, TPN and TPT respectively (Table 1). For DFZ, FBZ, FTL, PTZ, TTZ, PYR, TPN and TPT the mean EC_{50} values were 29.7, 63.9, 88.8, 115.7, 38.6, 67.5, 51.8, and 11.7 respectively in 2019 (Table 1). The distribution of *C. beticola* isolate sensitivity in EC_{50} values (mg/L) for all fungicides tested in 2019 ranged from <1 to >100 (Tables 1 and Figure 1).

Table 1. Comparison of mean effective concentration in growth by 50% (EC_{50}) for isolates of *Cercospora beticola* isolates to DFZ, FBZ, FTL, PTZ, TTZ, PYR, TPN and TPT 2019.

			EC_{50} (mg/L)[a]		
Active ingredient	**FRAC[b] code**	**Total # of isolates**	**Mean (s.e.)[c]**	**Minimum**	**Maximum**
Difenoconazole (DFZ)	3	107	29.7 ± 3.3	0.6	126.2
Fenbuconazole (FBZ)	3	107	63.9 ± 5.2	0.7	133.6
Flutriafol (FTL)	3	99	88.8 ± 4.7	4.1	137.8
Prothioconazole (PTZ)	3	107	115.7 ± 0.6	0.7	132.7
Tetraconazole (TTZ)	3	107	38.6 ± 2.8	0.7	136.5
Pyraclostrobin (PYR)	11	107	67.5 ± 4.3	0.6	128.0
Thiophanate-methyl (TPN)	1	99	51.8 ± 9.9	0.8	133.0
Triphenyltin OH (TPT)	30	107	11.7 ± 1.0	0.7	35.0

[a] EC50 values determined for two replications based on mean effective concentration in growth by 50% by spiral gradient dilution method.
[b] FRAC=Fungicide Resistance Action Committee group name based on chemical relatedness and mode of action
[c] s.e.=standard error of the mean.

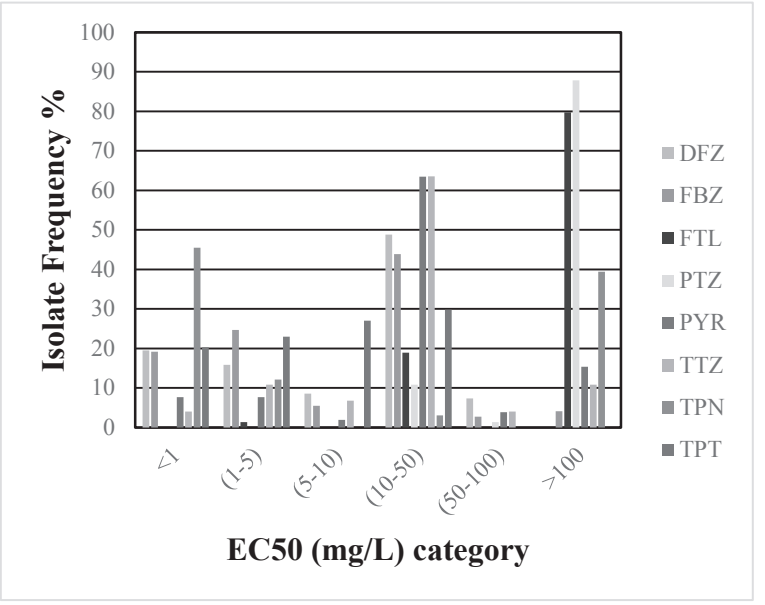

Figure 1. Frequency distributions of in vitro sensitivity of *C. beticola* isolates collected in 2019 from sugarbeet leaves. Sensitivity expressed as 50% inhibition of fungal growth (EC_{50}) in vitro, fungicide concentration estimate based determined by the spiral gradient dilution method. Difenoconazole=DFZ; fenbuconazole=FBZ; flutriafol=FTL; prothioconazole=PTZ; tetraconazole=TTZ; pyraclostrobin=PYR, Thiophanate-methyl=TPN and triphenyltin OH=TPT.

Sugarbeet (*Beta vulgaris*)
Alternaria leaf spot; *Alternaria* spp.

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In-vitro fungicide sensitivity distributions of *Alternaria* spp. isolates from sugarbeet 2019

Alternaria leaf spot (ALS) disease caused by *Alternaria* spp. in the *alternata* and *tenuis* species-group is common wherever sugarbeet is grown. Infection by *Alternaria* spp. has historically been considered a minor pathogen in sugarbeet production in the US, due to its more opportunistic or secondary nature. During the 2016 growing season, increased incidence and severity of ALS was observed in MI at levels high enough to have the potential to cause yield loss due to defoliation. From 2015 to 2018 *Alternaria* spp. with higher levels of insensitivity to many classes of fungicides were recovered from commercial production areas in Michigan. Isolates of *Alternaria* spp. were tolerant to the quinone outside inhibitor (QoI), triazole, triphenyltin OH and prothioconazole fungicides. Therefore, sensitivity monitoring of pathogen populations to inform the development of fungicide resistant management and fungicide use recommendations is essential.

Sample collection and geographical origin of isolates: Isolates of *Alternaria* spp. were collected from leaves with symptoms of ALS sampled from sugarbeet fields in east-central Michigan during Sep and Oct in 2019. Samples of up to 20 leaves from throughout a selection of sugarbeet production fields in Michigan and Ontario, CA were used in sensitivity testing. Isolates of *Alternaria* spp. were recovered from infected leaf tissue from multiple field locations using standard methods for the program. Mono-conidial isolates from individual ALS lesions were obtained to determine sensitivity to each fungicide described below. From each sugarbeet leaf representative lesions were cut with a cork borer; the lesions were chosen from similar sizes and in similar stages of sporulation and surfaced sterilized. All leaf disks derived from a particular sampling site were placed onto water agar media (WA) amended with streptomycin and $CaCO_3$ (1000 ml of distilled H_2O, 15 g of Bacto Agar, and 1.5 g of $CaCO_3$) for sporulation induction and positive identification. From individual lesions one conidium of *Alternaria* spp. was transferred to clarified V-8 (CV8) media amended with streptomycin and $CaCO_3$ (900 ml of distilled H_2O, 100 ml of CV8, 15 g of Bacto Agar, and 1.5 g of $CaCO_3$) for subsequent fungicide sensitivity assays.

In vitro fungicide sensitivity of *Alternaria spp.* by dilution gradient: Difenoconazole [DFZ; Inspire®, (Group 3)], fenbuconazloe [FBZ; Enable®, (Group 3)], flutriafol [FTL; Topguard®, (Group 3)], prothioconazole [PTZ; Proline®, (Group 3)], tetraconazole [TTZ; Eminent®125 SL, (Group 3)], pyraclostrobin [PYR; Headline® 2.08SC, (Group 11)] and triphenyltin OH [TPT; Super Tin® 80WP (Group 30)] and stock solutions of 10,000 mg/liter of each fungicide were prepared by dissolving commercial-grade fungicides in a sterile solvent. 50 ml of CV8 agar was poured into each dish, to form a layer of CV8 agar with a constant volume, thus when a stock solution is added to the agar, it results in a gradient from 0 to 1000 mg/liter across the agar surface. A method using a spiral gradient plater was used to determine effective concentration in inhibiting growth by 50% (EC_{50}). Pure cultures of *Alternaria* spp. were prepared as described above. Conidial suspensions are prepared by flooding colony Petri dishes with 1 mL distilled water and scraping the conidia free from the surface with a rubber

policeman. The conidial suspension (10 µL) was spread across the fungicide gradient plate from edge to center. Isolates were incubated for 14 d, at 24°C (two replications). The point coordinates at which the colonies start and end was recorded and entered into a software program, which calculates the EC_{50} for each isolate and fungicide.

Results

The mean EC_{50} values were estimated for each of the fungicides listed above. A total of 40 isolates were screened against the fungicides DFZ, FBZ, FTL, PTZ, TTZ, PYR, and TPT (Table 1). For DFZ, FBZ, FTL, PTZ, TTZ, PYR, and TPT the mean EC_{50} values were 1.8, 101.0, 84.1, 109.9, 80.3, 96.6 and 27.1 respectively (Table 1). The distribution of *Alternaria* spp. isolate sensitivity in EC_{50} values (mg/L) for all fungicides tested ranged from <1 to >100 (Table 1 and Figure 1).

Table 1. Comparison of mean effective concentration in growth by 50% (EC_{50}) for isolates of *Alternaria* spp. isolates to DFZ, FBZ, FTL, PTZ, TTZ, PYR, and TPT 2019.

			EC_{50} (mg/L)[a]		
Active ingredient	**FRAC[b] code**	**Total # of isolates**	**Mean (s.e.)[c]**	**Minimum**	**Maximum**
Difenoconazole (DFZ)	3	40	1.8 ± 0.5	0.6	20.8
Fenbuconazole (FBZ)	3	40	101.0 ± 5.6	51.6	133.6
Flutriafol (FTL)	3	40	84.1 ± 5.7	21.1	137.8
Prothioconazole (PTZ)	3	40	109.9 ± 7.4	2.9	132.7
Tetraconazole (TTZ)	3	40	80.3 ± 7.5	24.8	136.5
Pyraclostrobin (PYR)	11	40	96.6 ± 6.3	25.5	128.0
Triphenyltin OH (TPT)	30	40	27.1 ± 2.2	5.4	56.6

[a] EC50 values determined for two replications based on mean effective concentration in growth by 50% by spiral gradient dilution method.
[b] FRAC=Fungicide Resistance Action Committee group name based on chemical relatedness and mode of action
[c] s.e.=standard error of the mean.

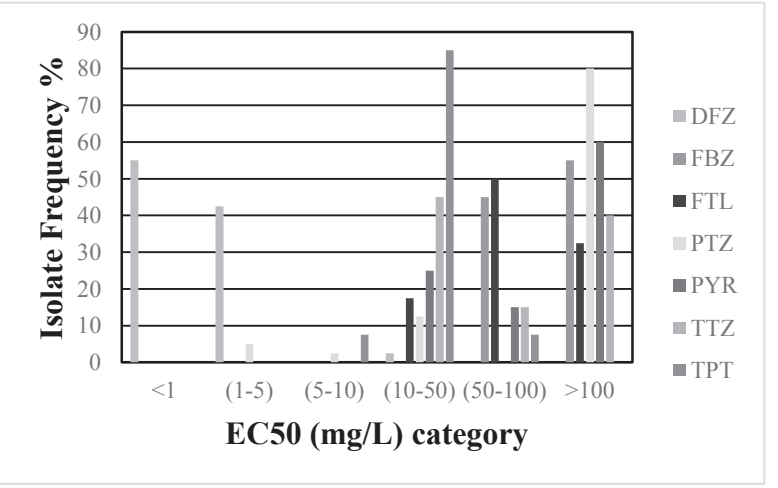


Figure 1. Frequency distributions of in vitro sensitivity of *Alternaria* spp. isolates collected in 2019 from sugarbeet leaves. Sensitivity expressed as 50% inhibition of fungal growth (EC_{50}) in vitro, fungicide concentration estimate based determined by the spiral gradient dilution method. Difenoconazole=DFZ; fenbuconazole=FBZ; flutriafol=FTL; prothioconazole=PTZ; tetraconazole=TTZ; pyraclostrobin=PYR and triphenyltin OH=TPT.

Alternaria leaf spot: Investigations on host interactions with Michigan crops

Malini A. Jayawardana[1] and Linda E. Hanson[2], [1]Michigan State University, [2]USDA ARS

Hosts	Sugar beet (leaves), Bean (pods), Potato (leaves)Tomato (fruits, leaflets), Apple (fruits)
Pathogen	*Alternaria alternata* species complex (AASC)
Pathogen isolated from	Sugar beet leaves, Potato leaves
Replicates	3
Method	Pathogen spore suspension (1 x 10^5 spores/ml) in water inoculated on detached leaves, leaflets, fruits or pods, kept in moist chambers for lesion development

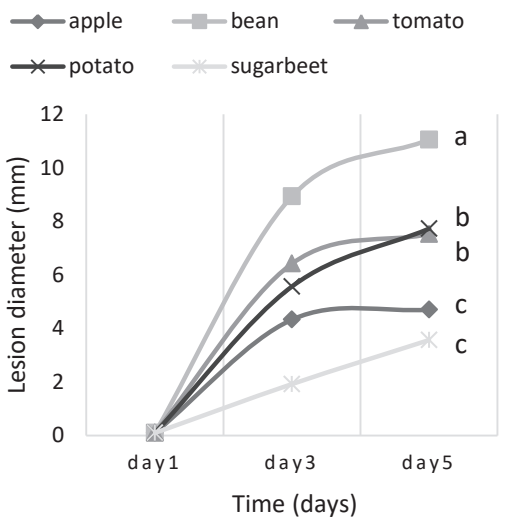


Figure 1: Comparison of the rate of disease progression for AASC in apple, bean, potato, sugar beet and tomato. Differences in the rate between the host tissues are indicated by different letters (Fisher's protected LSD at 0.05).

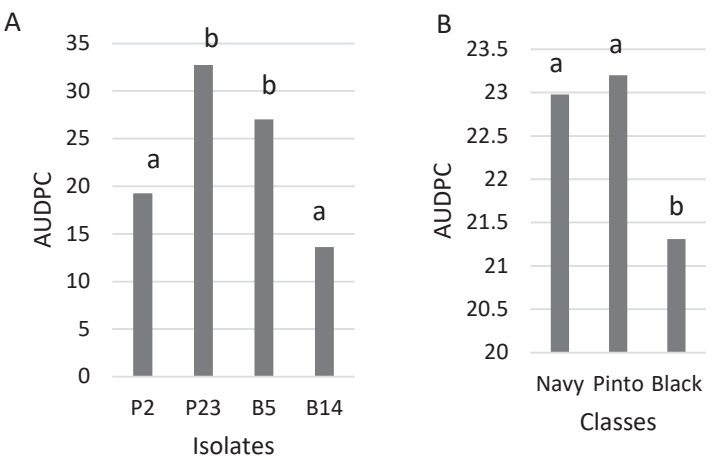


Figure 2: A. Histogram showing the AUDPC over 5 days among different AASC isolates on tomato leaflets. Isolates with a 'P' or 'B' were isolated from potato and sugar beet leaves respectively.
B. Histogram showing the AUDPC among different classes of beans averaged for eight AASC isolates.
Bars with the same letters are not significantly different by Fisher's protected LSD at 0.05.

Summary:

This experiment was conducted to examine host interactions in the *Alternaria alternata* species complex (AASC), the *Alternaria* spp. most common in Alternaria leaf spot of sugar beet. All AASC isolates collected from sugar beet or potato caused lesions on all hosts tested. Disease severity was irrespective of the host from which the pathogen was originally isolated (Figure 2A). This indicates that AASC likely has a wide host range. The disease progression rate varied between the hosts with the highest rate of progression in dry beans (Figure 1). This indicates that the AASC isolates from sugar beets and potato can be highly virulent on beans. Therefore, the pathogen can survive in the field even in the absence of sugar beets such as with rotation crops like dry beans and potatoes. The AUDPC values were compared between representative varieties from different bean classes and significant differences in disease progression were observed among varieties from classes (Figure 2B). This indicates a potential to identify more resistant varieties for use in rotation.

Examination of factors impacting *Cercospora beticola*

Stanley Berly[1], Claudia Phillips[2] , Linda Hanson[3] , [1]Michigan State University, [2]High School Honor Science Experience Program, and [3]USDA-ARS

Pathogen	*Cercospora beticola*
Source	Sugar beet leaves
Replicates	3
Methods	Test 1: Growth on lima bean agar as nonhost plant tissue model. Test 2: Growth on sugar beet leaf extract agar as host plant tissue model. Test 3: Growth on completely defined medium (Czapek's agar). Adjust factors such as carbon and nitrogen sources and measure effects.

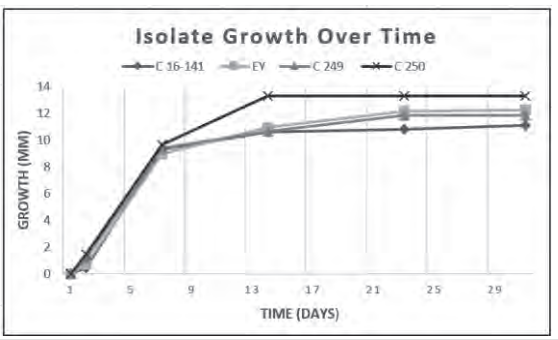


Figure 1. Growth of four diverse *Cercospora beticola* isolates on nonhost (lima bean) extract medium.

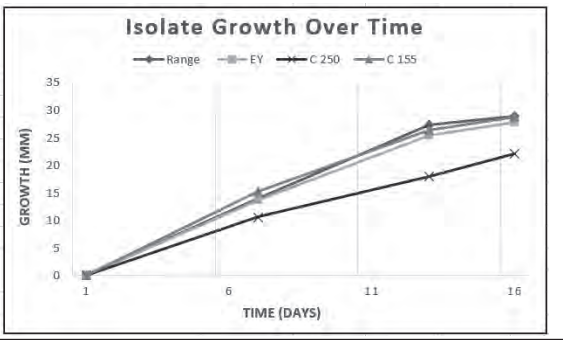


Figure 2. Growth of four diverse *Cercospora beticola* isolates on host (sugar beet leaf) extract medium.

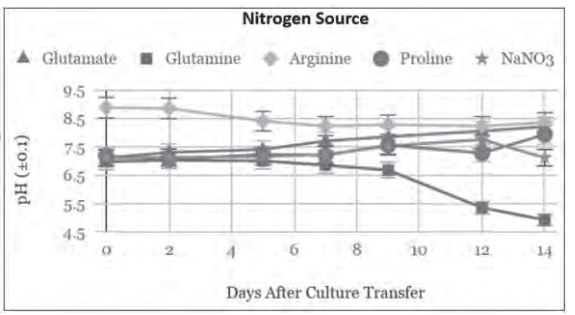


Figure 3. Changes pH over 14 days in Czapek medium supplemented with different nitrogen sources with *Cercospora beticola* growth.

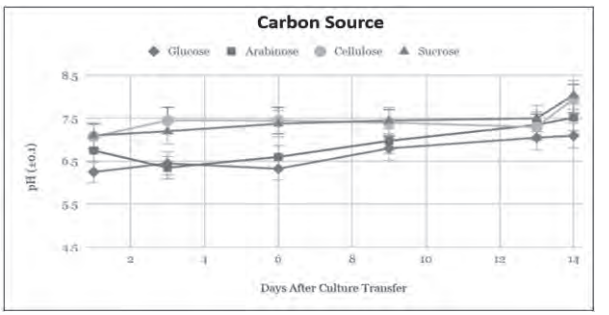


Figure 4. Changes in pH over 14 days in Czapek medium supplemented with different carbon sources with *Cercospora beticola* growth.

Cercospora beticola on both nonhost (lima bean; Fig. 1) and host (sugar beet leaf; Fig. 2) extract agar showed a typical sigmoidal growth curve with growth slowing after 7-14 days for three of four isolates. This is before the plate was covered, indicating a potential growth inhibitor. When observations continued for additional time (Fig. 1), growth remained static. Further tests will be done to examine potential factors.

When a defined medium was used with diverse potential nutrient sources added, the levels of pH from *Cercospora beticola* varied. Shown are results over 14 days on Czapek's agar with five different potential nitrogen sources (four amino acids and one inorganic) (Fig. 3) or four different carbon sources (Fig. 4). An increase in pH was observed with two amino acids or sodium nitrate, while media with glutamine showed significantly reduced pH. The pH also showed varied response to carbon sources (Fig. 4). As prior research showed that pH can impact toxicity of cercosporin, such as higher activity at elevated pH, these results show potential to influence pathogen activity. Further testing over a longer period are ongoing.

Planter and foliar applications for Sugar Beet Cyst Nematode management.

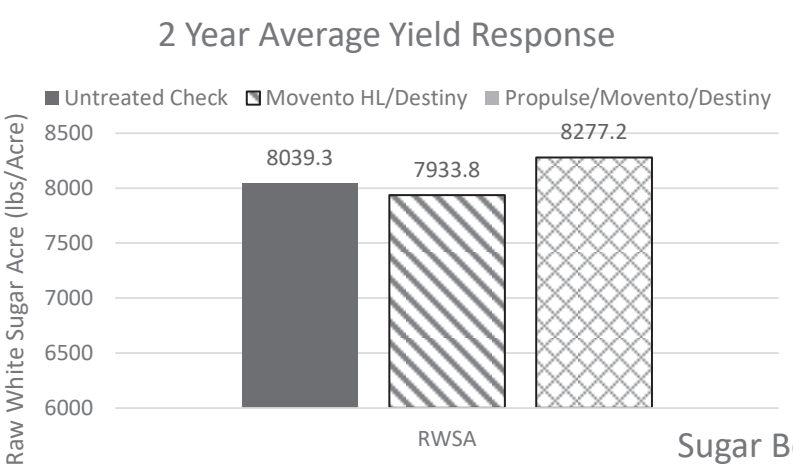
Michigan State Univ. Applied Nematology Lab, Dr. Marisol Quintanilla & Dr. Brian C. Levene. Research sponsored by Bayer Crop Sciences.

While studying the impact of currently registered pesticides on sugar beet cyst nematode, a couple treatment comparisons stood out (Table 1). The use of Propulse SC at the time of planting as a T-band within the seed furrow followed by two foliar applications of Movento HL and Destiny HC (treatment #3) during early sugar beet development has led to some positive trends for BCN development and sugar beet yield/quality. Utilizing only the two foliar applications of Movento and Destiny (Treatment #2) has shown less response, yet they seam to be important for the optimal response of Propulse.

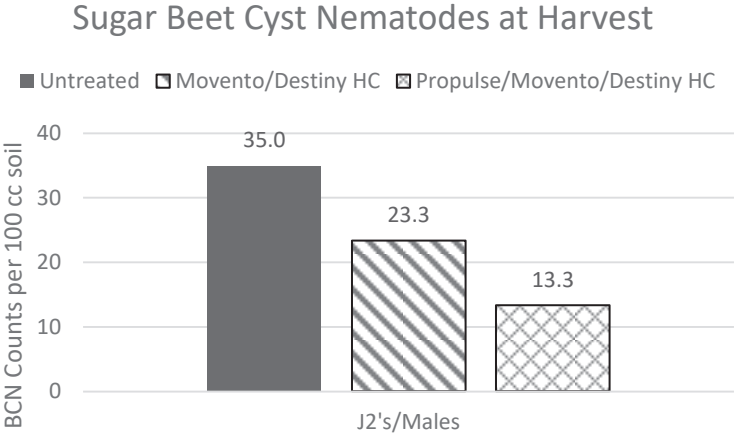
Table 1. In-furrow and Foliar Treatments for BASF Sugar Beet Trial, 2018.

Entry No.	Entry/Trt. Description	Form. Type	AI Conc.	Dose	Dose Unit	Trans. Dose	Trans. Dose Unit	Comment
1	UNTREATED							
2	MOVENTO HL	SC	480	88	G A/HA	2.5	OZ/A	14 & 30 Days After Emergence (DAE)
	DESTINY HC	XL	92	0.5	% V/V	0.5	% V/V	
3	PROPULSE	SC	400	397.5	G A/HA	13.6	OZ/A	T-band in-furrow
	MOVENTO HL	SC	480	88	G A/HA	2.5	OZ/A	14 & 30 DAE
	DESTINY HC	XL	92	0.5	% V/V	0.5	% V/V	

The two-year average for sugar produced per acre showed just over 8000 lbs. RWSA for the grower's standard practices utilizing a BCN susceptible seed in fields with known nematode presence. The foliar only program (treatment #2) with Movento and Destiny was somewhat less, but this was statistically similar to the untreated control treatment. However, when Propulse was included as a T-band at planting the two-year average for RWSA increased by more than 200 lbs./acre over the control. Results show this increase was from a small increase in tonnage combined with higher sugar concentration in the treated beets.



From the soil samples collected at harvest, there was a decline in the number of J2's or juvenile BCN present in the soil from both pesticide treatment combinations. The J2's is the infective stage of BCN that attack plant roots. The lowest BCN levels were from the treatment that utilized Propulse at planting as well as two foliar treatments. Therefore, the lowest BCN J2 levels and the highest yields were from the same treatment. The quantity of BCN eggs detected in the soil at harvest was similar for all treatments.



Movento Insecticide

LAKKE Ewald Farms, Unionville - 2019

Trial Quality: Excellent
Variety: B-12RR2N
Planted: April 4
Harv/Samp: Oct 15 / Oct 14
Plot Size: 5 reps
Row Spacing: 20 inch
Seeding Rate: 64,000

Soil Type: Loam
Fertilizer: 2x2:49#-16#-0#-9S w/ Mn & B, Broadcast 105#N by 28%
Prev Crop: Dry beans
Weather: Wet early, dry July & August, good after mid-September

Rhizoc Control: Fair/good control: Quadris I.F. (8 oz), 4-6 leaf (14 oz)
Cerc Control: Excellent control: See comments for materials
Other Pests: Sugarbeet cyst nematode, a low amount of root aphid was found

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Sugarbeet Cyst Nematode		
							Cysts	Eggs	J2's
Movento	**$1,821**	**10928**	299	**36.6**	19.2	97.5	16.0	488.0	164.0
Check	$1,744	10463	298	35.1	19.2	97.3	27.4	752.0	316.0
Average	$1,783	10696	299	35.8	19.2	97.4	21.7	620.0	240.0
LSD 5%	64.2	385.2	N.S.	1.0	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	2.1	2.1	1.0	1.7	1.0	0.3	60.5	28.2	65.7

Comments: Movento is an insecticide from Bayer Crop Science that the manufacturer believes could improve management of root aphid and sugarbeet cyst nematode. In 2019, Sugarbeet Advancement had two trials with Movento (see the Laracha results). In this trial, Movento had a significant increase in tonnage, RWSA, and revenue, while in the Laracha trial the Movento treatment had a significant decrease in tonnage. The reason for Movento behaving differently in these two trials is unknown, but it could be related to the timing of the applications and the tank mix partner used. Movento was intended to be applied twice, with the first application between the last 10 days in June and the 4th of July, and the second to be applied two weeks later. Here, the first application was made on June 19 and the second on July 3. The product is intended to be applied with 1% MSO and in this trial no other pesticides were added during either application. As a consequence of how differently Movento behaved in the two trials, it is not possible to draw a conclusion on the efficacy of this product, and more testing will need to be done before such a conclusion can be made. The Movento was applied at 2.5 oz./acre with 1% MSO in 20 gallons of water. The leafspot materials were as follows: 6/26 EBDC, 7/5 Proline + EBDC, 7/22 Super Tin + Topsin, 8/5 EBDC, 8/12 Provysol + Priaxor, 8/26 Super Tin + EBDC, 9/9 Inspire XT + EBDC, 9/22 Super Tin + Topguard.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270. Does not include early delivery premium.
Bold: Results are not statistically different from top ranking treatment in each column.

Movento Insecticide

Laracha Farms, Frankenmuth - 2019

Trial Quality: Good
Variety: B-1606
Planted: April 4
Harv/Samp: Oct 5 / Oct 4
Plot Size: 8 reps
Row Spacing: 20 inch
Seeding Rate: 65,000

Soil Type: Loam & loamy sand
Fertilizer: PP: 46 gal of 28%; 2x2: 10 gal of 7-18-8-5.5S
Prev Crop: Pickles
Weather: Wet early, dry July & August, good after mid-September

Rhizoc Control: Excellent control: Quadris I.F. (10 oz w/ Mustang); 6/18 (14 oz)
Cerc Control: Excellent control: See comments for materials
Other Pests: Sugarbeet cyst nematode

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Sugarbeet Cyst Nematode		
							Cysts	Eggs	J2's
Check	$1,171	7025	230	**30.5**	15.4	96.1	14.1	613	330
Movento	$1,105	6629	228	28.9	15.3	96.0	21.0	1260	320
Average	$1,138	6827	229	29.7	15.4	96.0	17.6	936.3	325.1
LSD 5%	N.S.	N.S.	N.S.	1.5	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	8.7	8.7	6.3	4.3	5.5	0.5	67.4	72.5	83.8

Comments: Use Data With Caution. Movento is an insecticide from Bayer Crop Science that the manufacturer believes could improve management of root aphid and sugarbeet cyst nematode. In 2019, Sugarbeet Advancement had two trials with Movento (see the LAKKE Ewald results). In this trial, Movento had a significant decrease in tonnage and in the LAKKE Ewald trial the Movento treatment had a significant increase in tonnage. The reason for Movento behaving differently in these two trials is unknown, but it could be related to the timing of the applications and the tank mix partner used. Movento was intended to be applied twice, with the first application between the last 10 days in June and the 4th of July, and the second to be applied two weeks later. In this trial, both applications were approximately three to four weeks later than intended. For tank mix partners, the product is intended to be applied with 1% MSO, but in this trial, it also was tank mixed with Super Tin for both applications. While there is no direct evidence for why Movento caused a decrease in tonnage at this location, it maybe possible that mixing Movento, MSO, and Super Tin could have caused some damage to the beets. No phytotoxic damage was observed, but Super Tin is known to be more likely to cause damage than some of the other fungicides, especially when tank mixed with other chemicals. As a consequence of how differently Movento behaved in the two trials, it is not possible to draw a conclusion on the efficacy of this product, and more testing will need to be done before such a conclusion can be made. The Movento was applied at 2.5 oz./acre with 1% MSO in 20 gallons of water. The leafspot materials were as follows: 6/26 EBDC, 7/8 Provysol + EBDC, 7/23 Super Tin + Topsin + EBDC + Movento + 1% MSO, 8/6 Delaro + Proline + EBDC, 8/21 Super Tin + Manzate + Movento + 1% MSO, 9/5 Propulse + EBDC, 9/20 Super Tin + EBDC. All treatments included MasterLock.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270. Does not include early delivery premium.
Bold: Results are not statistically different from top ranking treatment in each column.

Levesol Applied In-Furrow

Reif Farms, Saginaw - 2019

Trial Quality:	Very good	**Soil Type:**	Loam	**Rhizoc Control:**	Good control: Quadris I.F. (8 oz)
Variety:	C-G752NT				
Planted:	April 10	**Fertilizer:**	PPI: 60 gal of 28% & 5 gal of Thiosul	**Cerc Control:**	Excellent control: See comments for materials
Harv/Samp:	Oct 25 / Oct 21				
Plot Size:	4 rep	**Prev Crop:**	Wheat w/ Rye grass		
Row Spacing:	22 inch	**Weather:**	Water damage from early rain, dry July & August, wet late	**Other Pests:**	N/A
Seeding Rate:	63,000				

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft. of Row	
							27 Days	51 Days
Levesol	$1,598	9589	281	**34.1**	18.4	96.5	128.5	144.5
Check	$1,499	8993	284	31.7	18.6	96.5	138.0	156.5
Average	$1,549	9291	283	32.9	18.5	96.5	133.3	150.5
LSD 5%	N.S.	N.S.	N.S.	2.2	N.S.	N.S.	N.S.	N.S.
CV %	4.0	4.0	1.5	2.9	1.2	0.1	43.8	45.5

Comments: Levesol, from West Central, is 2% nitrogen fertilizer and a pure chelating agent that can be mixed with fertilizer in-furrow. According to the manufacturer, the chelating agent makes nutrients more available for uptake by the plant. Levesol was T-band in-furrow applied at 2 qt/acre with Quadris at 8 oz/acre and compared to the check which had Quadris only. Levesol resulted in significantly higher tonnage than the check. This is the first trial that Sugarbeet Advancement has done with this product. More research needs to be done to verify these results. The leafspot program was as follows: 6/23 Proline + Manzate + NDemand, 7/10 Super Tin + Topsin, 7/25 Flint Extra + Manzate + NDemand, 8/7 Provysol + Manzate, 8/24 Inspire XT + Manzate, 9/15 Super Tin + Manzate.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270.

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

QLF BOOST™ Fertilizer

Nancy and Dwight Bartle, Brown City - 2019

Trial Quality: Very Good
Variety: C-G515
Planted: May 8
Harv/Samp: Oct 7 / Oct 7
Plot Size: See comments
Row Spacing: 22 inch
Seeding Rate: 62,000

Soil Type: Loam
Fertilizer: Broadcast: 325# of 50/50 urea/AMS; See treatments for 2x2
Prev Crop: Corn - plowed
Weather: Wet early, dry July and August, good after mid-September

Rhizoc Control: Excellent control: See comments
Cerc Control: Excellent control: See comments for materials
Other Pests: Low levels of Alternaria leafspot

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft. of Row		Dead Beets / 1200 Ft	CLS
							12 Day	35 Day		
QLF BOOST™	—	7551	246	30.7	16.8	94.6	**67**	**212**	4	1
Check	—	7282	243	29.9	16.8	94.3	52	200	10	1
Average	—	—	244	30.3	16.8	94.4	59	206	7	1
LSD 5%	—	—	N.S.	N.S.	N.S.	N.S.	11.2	6.4	N.S.	N.S.
CV %	—	—	3.9	4.0	2.8	0.7	17.3	2.8	100.8	17.1

Comments: The QLF BOOST™ (4-0-3-2S) fertilizer was added to both the 2x2 blend and the Quadris T-band application. The check treatment 2x2: 10 gal of 10-34-0, 10 gal of 28%, 1 qt each of Soil Biotics B & Mn. The check treatment Quadris: 7 gpa of water, 8.1 oz of Quadris, 1.6 oz of Ez Mix, 2.3 oz of AgriSC. The QLF BOOST™ treatment 2x2: 9 gal of 10-34-0, 9 gal of 28%, 2 gal of BOOST™ 1 qt each of Soil Biotics B & Mn. The QLF BOOST™ treatment Quadris: 6 gpa of water, 1 gal of BOOST™ 8.1 oz of Quadris, 1.6 oz of Ez Mix, 2.3 oz of AgriSC.

The overall quality of this trial was very good. The QLF BOOST™ treatment provided higher stands in both the early and late population counts. Tissue sampling conducted in July revealed no significant difference in the amount of nutrients present in either the check or BOOST™ treatments. For the majority of the season, there were very low levels of both foliar and root diseases, with the exception of a little early Alternaria leafspot. According to the manufacturer of QLF BOOST™, part of the benefit this product provides comes from improved plant health which has an impact on root disease management. Due to the low root disease levels observed at this trial, it is possible this product did not have as great of an impact as it may have under high disease levels. While harvesting this trial, a sugar sample was lost for one of the replications. Because of this, the data reported here for tons/acre includes 6 reps, while the RWST, percent sugar, and clear juice purity include 5 reps. No revenue data is presented, and no statistics were done on RWSA, as this value is an estimate derived by multiplying the average RWST by the average tons per acre for both treatments. Both populations and the Cercospora leafspot rating include 9 reps. The leafspot program was the same for both treatments: 6/30 EBDC + Boost + Activator 90, 7/14 Proline + EBDC + Boost + Reguard, 8/8 Super Tin + Topsin + Boost, 8/23 Provysol + EBDC + Boost + Reguard, 9/10 Priaxor + EBDC + Reguard.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270. Does not include early delivery premium.

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

Midwestern BioAg (MBA) TerraNu Calcium & MicroPack

D & B Karg Farms, Harbor Beach - 2019

Trial Quality:	Very good	**Soil Type:**	Loam	**Rhiz Control:**	Excellent control: Quadris I.F. (7 oz) & 8 leaf (14 oz)
Variety:	C-G675	**Fertilizer:**	See comments for 2x2 information. Sidedressed: 33 gal of 28%		
Planted:	May 12			**Cerc Control:**	Excellent control: See comments for materials
Harv/Samp:	Nov 8 / Oct 17	**Prev Crop:**	Wheat / Radish		
Plot Size:	5 reps	**Weather:**	Wet early, dry July & August, wet fall	**Other Pests:**	N/A
Row Spacing:	22 inch				
Seeding Rate:	58,000				

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Populations 100 Ft. of Row	
							11 Days	43 Days
MBA TerraNu Blend	$1,550	9303	296	31.5	19.8	**95.2**	72.6	201.2
Grower's Normal Blend	$1,549	9292	290	32.0	19.6	94.8	89.0	198.6
Average	$1,550	9297	293	31.7	19.7	95.0	80.8	199.9
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	0.4	N.S.	N.S.
CV %	4.4	4.4	1.8	2.6	1.7	0.2	12.0	3.2

Comments: This trial was done to compare the grower's normal 2x2 fertilizer blend to a blend supplied by Midwestern BioAg that incorporated their TerraNu Calcium and TerraNu MicroPack products. TerraNu Calcium is promoted to improve crop quality and performance by providing boron in every granule and improving calcium uptake. TerraNu MicroPack provides a complete micronutrient package of 6 micros plus sulfur and calcium in every granule. As such MicroPack can provide up to 10x improved distribution as compared to other micronutrient sources. The total nutrients per acre were intended to be kept approximately the same with the biggest difference being that the Midwestern BioAg blend had about 6# less N, 5# less K_2O, 2# more sulfur, and 13# more calcium. The nutrients per acre of the Midwestern BioAg blend were 42#-51#-25#-17S-19Ca-1Mg-1B-0.5Cu-0.5Fe-3Mn-1Zn. There was no significant difference found for yield, RWST, or % sugar, but there was a significant difference found for clear juice purity. Tissue sampling was done on every replicate in July and no significant differences were found between the two blends. This cooperating grower and field may not provide the best opportunity for these products to show their potential benefit. D & B Karg Farms raise cattle and have applied manure to this field, however it has not had manure applied in the last several years. The leafspot materials were as follows: 1. EBDC, 2. Inspire XT + EBDC, 3. Super Tin + Topsin + EBDC, 4. Delaro + EBDC, 5. Super Tin + EBDC, 6. Topguard + EBDC.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270.

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

Insta-Cal vs. NDemand with Cercospora Applications

Reif Farms, Saginaw - 2019

Trial Quality: Excellent
Variety: B-1606
Planted: April 8
Harv/Samp: Nov 1 / Oct 25
Plot Size: 5 reps
Row Spacing: 22 inch
Seeding Rate: 63,000

Soil Type: Loam
Fertilizer: PPI: 67 gal of 28% & 7 gal of Thiosul
Prev Crop: Corn
Weather: Wet early, dry July & August, wet late

Rhizoc Control Good control: Quadris I.F. (8 oz)
Cerc Control: Excellent control: See comments for materials
Other Pests: N/A

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP
NDemand	$2,116	12695	281	45.2	18.6	96.1
Insta-Cal	$2,114	12683	277	45.8	18.3	96.2
Average	$2,115	12689	279	45.5	18.4	96.1
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	3.0	3.0	3.1	0.8	2.3	0.4

Comments: Insta-Cal (produced by Insta-Grow) is a foliar feed product that includes calcium nitrate (8% nitrate nitrogen & 9% calcium). According to sales representatives, this product provides more available calcium to the plant which may improve plant health and strengthen plant cell walls, leading to improved Cercospora leafspot management. NDemand 30L (Wilbur Ellis) is a foliar nitrogen product that is commonly used with Cercospora applications due to a belief that it promotes plant health which helps with disease management. In this trial, the grower compared the two products without having a true check (no foliar nutrient product). Each product was applied at a rate of 1 gallon per acre in the first three Cercospora applications. Due to the lack of a check, there is no way to know if either product truly improved yields or Cercospora management. Comparisons in this trial can only be made between the two products and there were no significant differences (95% confidence level) found for any of the metrics observed. However, in terms of tonnage, Insta-Cal was significantly better than NDemand at the 90% confidence level (p=0.058). At this location, there was a very low level of Cercospora leafspot and a rating was not done of the trial. Due to the low levels of Cercospora, plant health benefits of these products may not have been fully realized. The leafspot program was as follows: 6/23 Proline + Manzate + NDemand or Insta-Cal 7/10 Super Tin + Topsin + NDemand or Insta-Cal, 7/25 Flint Extra + Manzate + NDemand or Insta-Cal, 8/7 Provysol + Manzate, 8/24 Inspire XT + Manzate, 9/15 Super Tin + Manzate.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270.
Bold: Results are not statistically different from top ranking treatment in each column.

Mora-Leaf Foliar Nutrients

Helmreich Farms, Freeland - 2019

Trial Quality: Good
Variety: SX-1275N
Planted: May 15
Harv/Samp: Oct 25 / Oct 25
Plot Size: 6 reps
Row Spacing: 20 inch
Seeding Rate: 56,000

Soil Type: Loam
Fertilizer: 2x2: 40# N + MicroPack (2 Zn,2 Mn, 2 B, .5 Cu); PPI: 104# N by 28%; 6/27: 39# N by streamer
Prev Crop: Soybeans
Weather: Wet early, dry July & August, wet fall

Rhiz Control: Good control: Quadris I.F (7 oz) + 8 leaf (15.7 oz). See comments.
Cerc Control: Excellent control: See comments for materials
Other Pests: Root aphid

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP
Check	$1,187	7125	278	25.6	18.1	96.9
Mora-Leaf Foliar	$1,165	6993	277	25.2	18.0	97.0
Average	$1,176	7059	277	25.4	18.0	96.9
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
CV %	7.0	7.0	3.2	4.6	3.0	0.3

Comments: Mora-Leaf Plus is a water soluble, foliar nutrient distributed by Wilbur-Ellis which is intended to provide readily available nutrients to the plant. This product contains 20% each of nitrogen, phosphorus, and potassium; 0.02% boron; 0.05% each of copper, manganese, and zinc; 0.10% iron; and 0.0005% molybdenum. Mora-Leaf was applied by tank mix with 15.7 oz/acre of Quadris on June 22 (approximately 8 leaf) in a 7 inch T-band. The check was Quadris only. There were no known nutrient deficiencies in this field. No significant differences were found between Mora-Leaf and the check for any of the metrics observed. The leafspot program was as follows: 7/1 EBDC, 7/11 Provysol + EBDC, 7/25 Priaxor + EBDC, 8/8 Minerva Duo + EBDC, 8/22 EBDC, 9/5 EBDC. All were with Reguard adjuvant.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270.

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

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Sugarbeet Response to Starter Fertilizer, N Rate, and Plant Population

Seth Purucker, Andrew Chomas, and Kurt Steinke, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 25, 2019 (Harvest 10/14/19)	**Trts:** See below
Soil Type: Clay Loam; 2.4% OM; 8.2 pH; 15 ppm P (Olsen), 29 ppm P (Bray); 137 ppm K	**Population**: 3 ½ & 4 in. spacing
Variety: C-G675	**Replicated**: 4 replications

Treatment	RWSA	RWST	Tons/A	% Sugar	% CJP
Population, seeds A^{-1}					
50,000	7222	282	26	18.3	97.0
60,000	7373	283	28	18.3	97.1
$LSD_{(0.10)}$[a]	**NS[b]**	**NS**	**NS**	**NS**	**NS**
N Rate, lbs. N A^{-1}					
0	5262	281	19	18.2	97.3
80	7164	290	24	18.7	97.2
160	8452	285	30	18.5	97.0
240	8313	274	30	17.9	96.8
$LSD_{(0.10)}$	**612**	**5**	**2**	**0.3**	**0.2**
Starter Fertilizer					
2x2	7403	283	26	18.4	97.1
No 2x2	7192	282	25	18.3	97.0
$LSD_{(0.10)}$	**NS**	**NS**	**NS**	**NS**	**NS**

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

[b] NS, not significant

Summary: Trial quality was good. Treatments consisted of two populations (3½ and 4 inch spacing which resulted in 50,000 or 60,000 seeds per acre), four N rates (0, 80, 160, 240 lbs. N/A), and 2x2 applied starter fertilizer (with and without). All treatments with starter fertilizer received 40 lbs. N/A as 28%, 20 lbs. P2O5/A, 50 lbs. K2O/A, and 2 lbs. Mn/A applied 2 inches below and two inches to the side of the seed. Treatments at the 0 lbs. N/A rate did not receive any N in starter application only P, K, and Mn. Starter N was subtracted from sidedress N application rates. Sidedress N applications occurred June 4 at the 2-4 leaf stage using 28% UAN.

No yield or quality differences occurred due to population or starter fertilizer. In this study, a total N rate of 80 lb. N/A resulted in the greatest RWST, but total N rates of 160 lb. N/A resulted in the greatest RWSA, tonnage, and expected net return. Gross grower payment maximized at 160 lbs. N/A. With N fertilizer and trucking costs taken into consideration, 160 lbs N/A still resulted in the greatest expected net return. Although not observed in 2019, starter (2x2) applied N may provide opportunities to increase N efficiency, decrease overall N rates, and help address mid-season variable weather patterns. Increased tonnage and expected return may not always offset input costs and greater input intensities must be balanced with impacts on disease development.

Treatment	Gross Grower Payment ($/A)	Expected Net Economic Return Minus N Costs ($/A)[a]	Expected Net Economic Return Minus N Costs and Trucking ($/A)[b]
Population, seeds A^{-1}			
50,000	1415	1362	1266
60,000	1444	1392	1294
$LSD_{(0.10)}$[c]	**NS[d]**	**NS**	**NS**
N Rate, lbs. N A^{-1}			
0	1031	1031	961
80	1403	1368	1275
160	1656	1585	1474
240	1629	1523	1409
$LSD_{(0.10)}$	**120**	**120**	**112**
Starter Fertilizer			
2x2	1450	1397	1299
No 2x2	1409	1356	1261
$LSD_{(0.10)}$	**NS**	**NS**	**NS**

[a, b] Gross grower payment and net economic returns based upon harvest date adjustment factor for tonnage and RWST, an N price of $0.44/lb., and trucking costs of $3.75/T.

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

[d] NS, not significant.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Sugarbeet Nitrogen Response Following Corn

Kurt Steinke and Andrew Chomas, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 25, 2019 (Harvest 10/14/19)	**N Rates**: See below
Soil Type: Clay loam; 2.9% OM; 7.9 pH; 14 ppm P (Olsen); 163 ppm K	**Population**: 4 in. spacing
Variety: C-G675	**Replicated**: 4 replications

N Trt. (Total lb. N/A)	RWSA	RWST	Tons/A	% Sugar	% CJP
0 – Check	4275	277	15.4	17.9	97.2
40	6651	283	23.5	18.5	96.6
80	6450	285	22.6	18.5	97.0
120	6780	290	23.4	18.8	96.8
160	9063	282	32.1	18.4	96.7
200	8210	277	29.6	18.1	96.6
240	8723	259	33.7	17.1	96.3
$LSD_{(0.10)}$[a]	**1208**	**12**	**4.0**	**0.7**	**0.3**

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

N Trt. (Total lb. N/A)	Gross Grower Payment ($/A)	Net Economic Return Minus N Costs ($/A)[a]	Net Economic Return Minus N Costs and Trucking ($/A)[b]
0 – Check	845	845	787
40	1317	1301	1213
80	1276	1244	1159
120	1344	1296	1208
160	1793	1729	1609
200	1624	1544	1433
240	1729	1633	1507

[a, b] Gross grower payment and net economic returns based upon harvest date adjustment factor for tonnage and RWST, an N price of $0.40/lb., and trucking costs of $3.75/T.

Summary: Trial quality was good. 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 25 with 10 lb. N/A available in the top foot of soil. Sidedress N applications completed at the 2-4 leaf stage on June 4. Cool, wet early spring soil conditions slowed emergence and early-season plant development with two-inch soil temperatures staying above 50F after May 15. Five and seven inches of rainfall in May and

June, respectively, likely caused some degree of N loss via denitrification. Lack of soil moisture during July and August (2.3 and 1.0 inches rainfall, respectively) limited tonnage and bulking. Optimal tonnage and RWSA were near 160 lb N/A. Gross grower payment and net returns were all maximized at 160 lb N/A (40 N 2x2 with 160 N sidedress). Noticeable declines in sugar quality occurred at or near 240 lb N/A. Bulk N applications, in this study coulter-inject sidedress, occurred after the cool, moist May weather conditions thus avoiding some degree of N loss as compared to pre-plant N management practices. Bulk N applications during early vegetative growth allow the grower to avoid some N loss opportunities in between planting and early vegetative development. However, dry soil conditions during early vegetative growth stages (not observed in 2019) can create difficulties with getting N into the plant and affect the efficacy of sidedress N application strategies (surface applied N as compared to subsurface coulter-inject N).

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Does Sugarbeet Row Spacing Affect the Need for Starter Nitrogen?

Kurt Steinke[1], Brian Groulx[2], Seth Purucker[1], and Andrew Chomas[1]
[1] Michigan State University and [2] Michigan Sugar Company

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv.
Planting Date: April 25, 2019 (Harvest 10/11/19)	**Trts:** See below
Soil Type: Clay Loam; 2.4% OM; 8.2 pH; 15 ppm P (Olsen), 29 ppm P (Bray); 137 ppm K	**Population**: 4 in. spacing
Variety: C-G675	**Replicated**: 4 replications

Treatment	RWSA	RWST	Tons/A	% Sugar	% CJP
Row Spacing					
22 inch	8906	247	36	16.4	96.2
30 inch	6960	275	25	18.0	96.5
LSD$_{(0.10)}$[a]	**1084**	**7**	**4**	**0.4**	**NS[b]**
N Placement					
28% N, 2x2	7890	258	31	17.0	96.4
Urea w/UI[c], PRE	7975	264	31	17.4	96.3
LSD$_{(0.10)}$	**NS**	**NS**	**NS**	**0.4**	**NS**

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

[b] NS, not significant

[c] UI, Urease inhibitor

Summary: Trial quality was good. Four treatments were evaluated in a split-plot design and included: 1) 22 inch rows with 40 lbs. N/A 2x2 and 120 N sidedressed (2-4 lf), 2) 22 inch rows with 40 lbs. N/A applied PRE and 120 N sidedressed (2-4 lf), 3) 30 inch rows with 40 lbs. N/A 2x2 and 120 N sidedressed (2-4 lf), and 4) 30 inch rows with 40 lbs. N/A applied PRE and 120 N sidedressed (2-4 lf). Treatments with 2x2 received 40 lbs. N/A using 28% UAN two inches below and two inches to the side of the seed at planting. Treatments with N applied PRE received 40 lbs. N/A using urea with a urease inhibitor broadcast applied immediately following planting. Sidedress N applications were completed at the 2-4 leaf stage on June 4 for a total N application rate of 160 lb./A. There was no interaction between row spacing and starter N, only main effects of row spacing or N placement on specific parameters. Percent (%) sugar and RWST were significantly greater when utilizing 30 inch rows. However tonnage and RWSA were significantly greater utilizing 22 inch rows.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Potassium Effects on Sugar Quality and Sugarbeet Removal Rates

Sarah MacDonald, Andrew Chomas, and Kurt Steinke, Michigan State University

See soil.msu.edu for more information

Location: Saginaw Valley Research and Extension Center	**Tillage**: Conv., 30-in. row
Planting Date: April 26, 2019 (Harvest 10/14/19)	**Trt's**: See below
Soil Type: Clay loam; 2.4% OM; 7.9 pH; 16 ppm P (Olsen); 148 ppm K; CEC 15.6	**Population**: 4 in. spacing
Variety: C-G675	**Replicated**: 4 replications

Treatment (Total lb. /A)[a]	RWST	% CJP
0 N + 0 K	279	97.0
0 N + 150 K	279	97.0
0 N + 300 K	277	96.7
80 N + 0 K	281	97.0
80 N + 150 K	281	96.8
80 N + 300 K	284	96.9
160 N + 0 K	268	96.2
160 N + 150 K	276	96.6
160 N + 300 K	286	96.8
$LSD_{(0.10)}$[b]	**7**	**0.3**

[a] Total lb./A refers to lb. N and K_2O respectively.

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

Treatment (Total lb. /A)[a]	Tons/A	RWSA	% Sugar	K Root Conc. (%)	K removal (lb. K_2O/T)
0 N	14	3786	18.1	0.73	6.5
80 N	19	5429	18.3	0.75	6.4
160 N	24	6729	18.1	0.75	6.2
$LSD_{(0.10)}$[b]	**3**	**912**	**NS**	**NS**	**NS**
0 K	18	5002	18.0	0.75	6.3
150 K	19	5376	18.2	0.73	6.0
300 K	20	5566	18.4	0.76	6.7
$LSD_{(0.10)}$	**NS**	**NS**	**NS**	**NS**	**0.5**

[a] Total lb./A refers to lb. N and K_2O respectively.

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

Treatment (Total lb. /A)[a]	Gross Grower Payment ($/A)	Net Economic Return Minus N and K Costs ($/A)[b]	Net Economic Return Minus N, K, and Trucking Costs ($/A)[c]
0 N	750	710	659
80 N	1076	1000	929
160 N	1333	1222	1132
$LSD_{(0.10)}$[d]	**181**	**181**	**170**
0 K	990	955	887
150 K	1065	990	917
300 K	1104	987	914
$LSD_{(0.10)}$	**NS**	**NS**	**NS**

[a] Total lb./A refers to lb. N and K_2O respectively.

[b,c] Gross grower payment and net economic returns based upon harvest date adjustment factor for tonnage and RWST, an N price of $0.44/lb., K price of $0.27/lb., and trucking costs of $3.75/T.

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

Summary: Trial quality was average to good due to some standing water soon after planting. Treatments consisted of three N rates (0, 80, 160 lb. N/A using 28% UAN) and three K rates (0, 150, 300 lb. K_2O/A using MOP) in a randomized complete block design including a check. All treatments other than the 0 N rate received 40 lb. N/A as 2x2 at planting on April 26. The remainder total N was applied sidedress at the 2-4LF stage on June 4 using 28% UAN. All three K rates were pre-plant incorporated on April 25. An interaction between N rate and K rate significantly affected RWST and CJP. The 160 N w/ 0 K treatment was the only combination that significantly reduced RWST. Purity significantly decreased in the 0 N w/ 300 K, 160 N w/ 0 K, and 160 N w/ 150 K combinations. Due to no interaction between N and K rate, main effects are displayed for tonnage, RWSA, % sugar, % K, and K removal. Tonnage and RWSA increased as N rate increased however, % sugar, % K, and K removal in root tissue were not affected. No differences were observed in RWSA, tonnage, percent sugar, or % K due to K rate. The K removal in root tissue significantly increased for the 300 K treatment. Nitrogen rates continued to significantly increase gross grower payment and net economic returns up to 160 lb. N/A. No differences were observed for gross grower payment and net economic returns due to K rate. Potassium removal rates averaged 6.3 – 6.4 lb. K_2O/T across both N and K rates. Lack of yield response to K rate was likely due to pre-plant soil K concentrations being above the critical value for sugarbeet. May through June precipitation was 89% above 30-year means indicating sufficient soil moisture which has been shown to increase the ability of sugarbeet to utilize available K. When soil test values are at or above critical K concentrations, response to K application is unlikely under adequate soil moisture conditions. Trial will be repeated in 2020.

Effect of Nitrogen Rates on Grower Income, Yield and Quality in Ontario

Laura Van Eerd and Sean Vink

Location	pH	OM	P	K	CEC	Planting	N Applied	Harvest
Brook*	7.2	2.7	23	174	17.0	Late May	25-Jun	17-Sep
Oldfield*	6.6	2.3	33	205	16.6	Late May	27-Jun	16-Sep
Pine*	7.2	4.1	25	152	18.9	Late April	25-Jun	17-Sep
Union*	7.3	2	35	162	22.3	Late April	24-Jun	13-Sep
Base	7.5	1.4	19	157	21.7	May 26-28	24-Jun	27-Sep
Oldfield-S	6.6	2.3	69	365	6.9	May 26-28	24-Jun	27-Sep
Bear	6.4	3.4	17	159	19.4	Early April	07-Jun	16-Sep
Greenvalley	7.6	2.7	35	183	26.9	Early April	07-Jun	17-Sep
Dover Center	7.5	4	42	216	29.0	27-May	24-May	16-Sep
Chatham*	7.4	2.5	32	123	15.0	Early April	27-May	27-Sep
Lambton	7.6	3.4	63	266	26.8	11-Apr	07-Jun	30-Sep

*sites had N fertilizer at planting. Shading indicates narrow rows vs 30" rows in white.

Nitrogen broadcast applied in season at 0, 60, 120, 180 lb N /ac

Location	T-rt No.	N rate lb N/A	Net $/A	RWSA	RWST	T/A	%suc	%CJP
all 11 sites	1	0	$ 1,010 b	7495 b	**260 a**	28.9 b	**17.5 a**	**95.2 a**
	2	60	**$ 1,130 a**	**8531 a**	**257 a**	**33.2 a**	**17.4 a**	**95.0 ab**
	3	120	**$ 1,110 a**	**8641 a**	245 b	**35.1 a**	16.8 b	94.6 b
	4	180	$ 1,030 b	**8325 a**	236 c	**35.1 a**	16.4 c	94.3 c
		se	30.9	222.3	1.8	0.8	0.1	0.1
most profitable N rate at each location and corresponding yield at that N rate								
Brook*	1	0	$ 1,020	7,850	233	33.7	16.2	94.3
Oldfield*	3	120	$ 956	9,293	230	33.1	19.2	94.6
Pine*	2	90	$ 685	5,654	195	28.9	13.9	93.7
Union*	2	90	$ 1,230	9,305	261	35.7	17.7	94.8
Base	3	120	$ 1,310	9,873	305	33.9	19.0	96.6
Oldfield-S	2	60	$ 1,280	9,439	294	32.2	19.4	95.9
Bear	2	60	$ 1,360	10,214	258	39.7	17.5	94.5
Greenvalley	3	120	$ 1,050	8,350	223	37.4	15.5	94.4
Dover Center	2	60	$ 1,120	8,485	250	34.0	17.0	94.4
Chatham*	2	120	$ 1,510	11,097	298	37.3	20.2	94.6
Lambton	3	120	$ 1,010	7,933	244	32.5	16.6	95.1
		average	$ 1,140	8,863	254	34.4	17.5	94.8
		se	$ 79.72	554	5.44	2.1391	0.287	0.3361

Means followed by the same lettter are not significantly different (P<0.05)

Net $/A = $40 beet payment, trial average RWST (250) subtract N fertiler ($0.50/lb), trucking $6/T

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

A portion of this research was funded by the Canadian Agriculture Partnership, a five-year federal-provincial-territorial initiative. Ontario Sugarbeet Growers Association. Michigan Sugar Compay

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

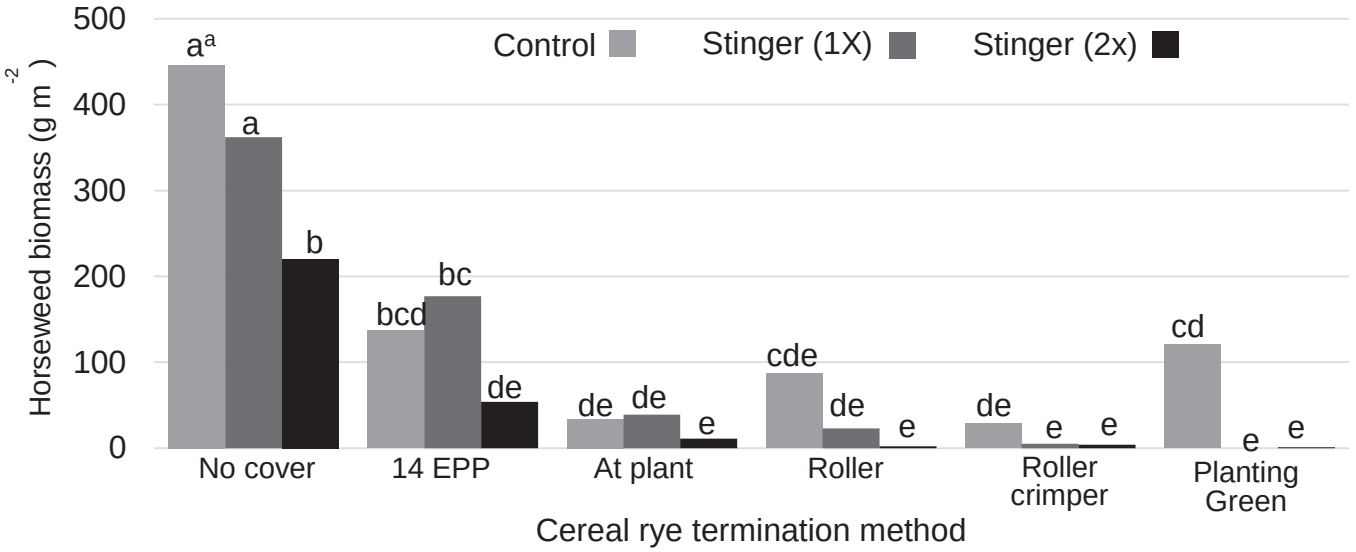
Integrating cereal rye to manage glyphosate-resistant horseweed in sugarbeet

Brian Stiles and Christy Sprague, Michigan State University

Location: MSU Agronomy Farm (East Lansing)	**Cereal rye termination dates:**
Soil Type: Loam	**Before planting (EBD):** May 14, 2019
O.M.: 3.5%	**At plant (PBD):** May 28, 2019
pH: 5.8	**Delayed burndown (DBD):** June 11, 2019
Replicated: 4 times	**Sugarbeet:** Crystal G675
Cereal rye: 'Wheeler' at 60 lbs/A	**Planting rate:** 3 7/8" spacing
Planting date: November 8, 2018	**Planting date:** May 28, 2019

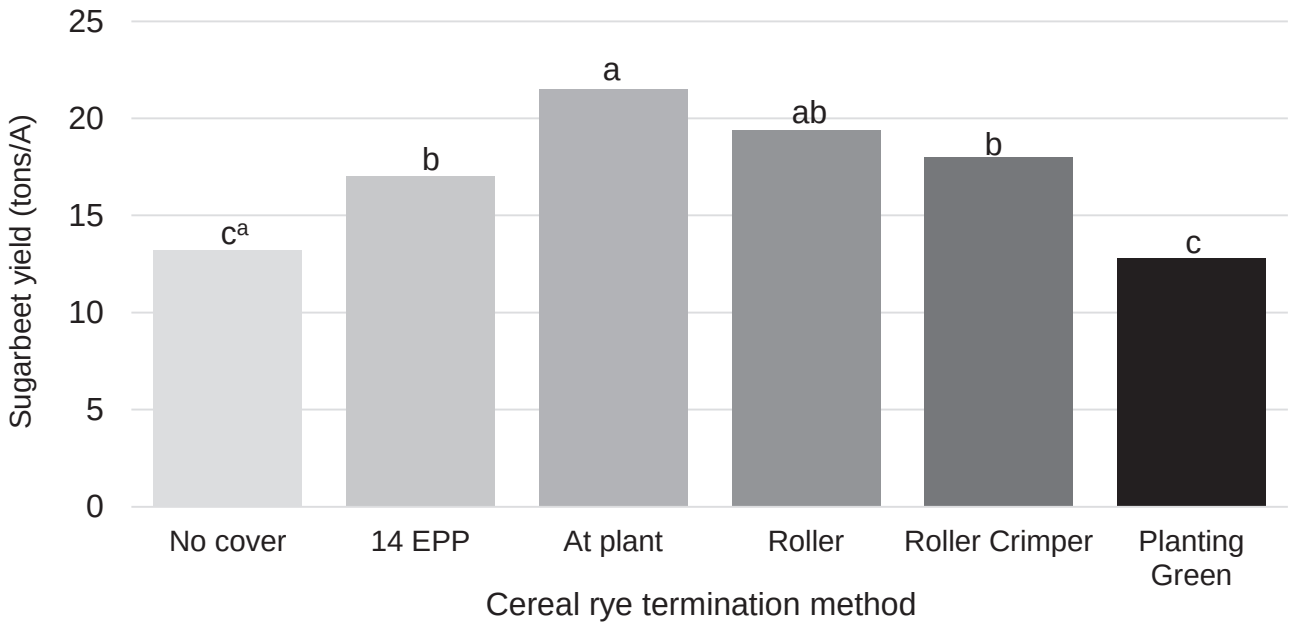
Summary: Glyphosate-resistant horseweed (marestail) poses as a major challenge for Michigan sugarbeet farmers. Incorporating multiple management strategies, including cover crops, may improve horseweed control. In 2019 a study was conducted in East Lansing, Michigan to evaluate the effects of fall-planted cereal rye termination time and method combined with different POST herbicide treatments on horseweed control. Cereal rye was drilled at 60 lb/A in fall of 2018. Cereal rye treatments included: early burndown (EBD) 14 d prior to sugarbeet planting, burndown at planting (PBD), PBD + roller, and PBD + roller crimper, a delayed burndown (DBD) 14 d after planting, and a no cover control. The burndown treatments consisted of glyphosate applied at 32 fl oz + ammonium sulfate. The three herbicide treatments consisted of two POST applications when sugarbeets were at the 2- and 6-8 leaf stage. The treatments included: 1) glyphosate twice (control), 2) glyphosate (22 fl oz) followed by glyphosate (22 fl oz) + Stinger (4 fl oz) (one Stinger application) and 3) glyphosate (22 fl oz) + Stinger (2 fl oz) followed by glyphosate (22 fl oz) + Stinger (4 fl oz) (two Stinger applications). This study was established later in the growing season than we wanted due to the wet spring. Horseweed biomass 14 d after planting (DAP) was 11 times lower where rye was planted compared with the no cover control, regardless of termination method. All cereal rye treatments, regardless of termination time, reduced horseweed biomass 14 d after the last herbicide application and was similar to horseweed biomass reductions with the two applications of Stinger without a cover (Figure 1). The DBD with either of the Stinger treatments reduced horseweed biomass by 99%. At harvest, the cereal rye cover crop reduced horseweed biomass up to 75%. There were some differences among termination methods, with the DBD, PBD, and roller crimper showing the greatest reduction in horseweed biomass. The main effect herbicide treatments showed a greater reduction in horseweed biomass with two application of clopyralid followed by clopyralid one application, followed by the control. Even though horseweed biomass was lowest in the DBD treatment, sugarbeet yield was reduced and was not different compared with the no cover control, due to reduced sugarbeet growth in the DBD (Figure 2). Sugarbeet yield for the EBD, roller crimper, and roller were all similar and the PBD showed the highest overall sugarbeet yield and was not different than the roller treatment. Regardless of Stinger treatment, sugarbeet yields were the same. Integrating cereal rye for horseweed management in sugarbeet has shown some positive results. It may be possible to use the delayed burndown treatment if sugarbeets are strip-tilling sugarbeets. It will be important to continue to examine these different strategies in the future, especially at a more normal sugarbeet planting date.

Figure 1. Termination time and herbicide treatment influenced horseweed biomass 8 WAP (14 d after last POST herbicide application). Cereal rye reduced horseweed biomass, regardless of herbicide treatment, compared with the no cover control. If cereal rye was terminated at planting or later, an early application of Stinger was not needed.



[a] Treatment bars with different letters are significantly different from each other.

Figure 2. Cereal rye termination method affected on sugarbeet yield. Cereal rye terminated at planting with and without the roller yielded the highest (19.5-21.5 tons/A). Terminating cereal rye after sugarbeet planting reduced yield compared with the earlier termination times.



[a] Treatment bars with different letters are significantly different from each other.

Sugarbeet tolerance to postemergence applications of Ultra Blazer – Year 2

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location: Richville (SVREC)	**Application timings**: 2-lf beets (May 24), 6 lf beets (June 12), 12-lf beets (July 2)
Planting Date: April 23, 2018	**Herbicides:** see treatments
Soil Type: Clay loam	**O.M.:** 2.5 **pH:** 7.1
Replicated: 4 times	**Variety:** Crystal G675

Table 1. Sugarbeet tolerance to POST applications of Ultra Blazer (aciflurofen) applied at various sugarbeet stages.

Herbicide treatments[a]	Timing	Injury (June 19)	Injury (July 17)	Injury (Sept. 18)	Yield	RWSA
		—%—	—%—	—%—	– ton/A –	– lb/A –
Roundup PowerMax (22/22/22 fl oz)		0	0	0	19.2	5796
Ultra Blazer (8/8/8 fl oz)	2, 6, 12 lf	73*[b]	55*	26*	11.2*	2936*
Ultra Blazer (16/16/16 fl oz)	2, 6, 12 lf	70*	63*	23*	8.4*	2132*
Ultra Blazer (16 fl oz)	2-lf	63*	50*	23*	13.6*	3704*
Ultra Blazer (24 fl oz)	2-lf	69*	48*	26*	12.3*	3146*
Ultra Blazer (16 fl oz)	6-lf	38*	11	1	16.8	4732
Ultra Blazer (24 fl oz)	6-lf	31*	14	3	16.9	4967
Ultra Blazer (16 fl oz)	12-lf	-	24*	3	15.6	4671
Ultra Blazer (24 fl oz)	12-lf	-	20*	2	15.7	4306
Ethotron (12 fl oz) + Ultra Blazer (16 fl oz)	6-lf	33*	13	2	13.9*	3957*
Stinger (4 fl oz) + Ultra Blazer (16 fl oz)	6 lf	23*	5	5	19.7	5689
$LSD_{0.05}$[c]		*10*	*16*	*12*	*3.53*	*1175*

[a] Roundup PowerMax was included in all postemergence treatments at the rates listed in the first treatment. These treatments also included AMS at 17 lb/100 gal.

[b] Sugarbeet injury, yield and RWSA data with asterisks (*) are significantly different from the Roundup alone control.

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

Summary: Options are extremely limited for POST control of glyphosate-resistant pigweed (waterhemp and Palmer) in sugarbeet. Ultra Blazer (aciflurofen) is an older Group 14 herbicide that has activity on pigweed species. This is the second year in which we have conducted a field trial to evaluate sugarbeet safety to POST applications of Ultra Blazer. All applications of Ultra Blazer resulted in sugarbeet injury. Injury symptoms from Ultra Blazer consist of leaf speckling/bronzing of the sugarbeet leaves and in the case of applications to 2-leaf sugarbeet severe stand loss. This is the first year where we have observed severe injury from applications to 2-leaf sugarbeets that reduced stand and yield. Ultra Blazer applications to 6- and 12- leaf sugarbeet still resulted in injury, however sugarbeet was able to recover over time and sugarbeet yield and recoverable white sugar were not affected. The only exception to this was the tank-mix of Ultra Blazer and Ethotron applied to 6-leaf sugarbeet. Examining our research and that of it of colleagues in North Dakota, it appears if an Ultra Blazer is ultimately pursued applications would have to be on larger beets (>6-leaf). The question still remains for use: 1) What level of sugarbeet injury are growers comfortable with if there is no effect on yield.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Rotational crop safety with postemergence applications of ethofumesate -Year 2

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location: Richville (SVREC)	**Sugarbeet planting date:** April 30, 2018
Corn planting date: May 7, 2019	**Soil Type:** Clay loam
Soybean planting date: May 7, 2019	**O.M.:** 3.0 **pH:** 7.5
Dry bean planting date: June 19, 2019	**Replicated:** 4 times

Table 1. Tolerance of corn, soybean, and black beans the year following postemergence applications of high rates of ethofumesate[a].

		30 d after planting		
Herbicide treatments[b]	**Timing**	**Injury**	**Stand**	**Yield**
Corn 'Stine 9316'		— % —	- #/30' row -	— bu/A —
No herbicide		0	20	94.0
Ethofumesate (32/32/32/32 fl oz)	2-lf, + 2 WAT – 4 times	0	19	99.5
Ethofumesate (128 fl oz)	June 15	0	19	86.5
Ethofumesate (128 fl oz)	July 15	0	19	92.4
Ethofumesate (128 fl oz)	August 15	0	19	90.3
Soybean 'Stine 14RD62'				— bu/A —
No herbicide		0	44	53.2
Ethofumesate (32/32/32/32 fl oz)	2-lf, + 2 WAT – 4 times	0	48	47.4
Ethofumesate (128 fl oz)	June 15	0	45	49.2
Ethofumesate (128 fl oz)	July 15	0	44	51.6
Ethofumesate (128 fl oz)	August 15	0	44	49.3
Black bean 'Zenith'				— cwt/A —
No herbicide		0	55	12.1
Ethofumesate (32/32/32/32 fl oz)	2-lf, + 2 WAT – 4 times	0	56	14.3
Ethofumesate (128 fl oz)	June 15	0	54	13.8
Ethofumesate (128 fl oz)	July 15	0	57	14.6
Ethofumesate (128 fl oz)	August 15	0	55	14.2

[a] Plots were kept weed-free with the Roundup PowerMax in corn and soybean and with Dual Magnum + Prowl H2O in dry bean.

[b] Herbicide treatments were applied postemergence to sugarbeet in 2018.

Summary: Ethofumesate is a Group 18, selective herbicide used for weed control in sugarbeet. Historically, ethofumesate was primarily used preemergence as part of an overall program for residual weed control of key Michigan weeds. However, it can be used POST and over the past couple of years we have observed some positive results with split-POST ethofumesate at rates as high as 2 pt/A for glyphosate-resistant waterhemp control. The recent label change increased the POST ethofumesate rates from 12 to 128 fl oz/A. However, one of the issues with using some of these higher rates of ethofumesate POST is the current crop rotation restrictions. The current ethofumesate label states: do not rotate to any crops other than sugarbeets or ryegrass for 12 months following applications totaling more than 12 fl oz/A or 6 months following postemergence applications of 12 fl oz/A or less. In 2017 and 2018 we established a plant back studies to examine the crop safety of corn, soybean and dry bean the year following high application rates of ethofumesate. Our two year's results have been extremely positive, in that there did not appear to be any ethofumesate carryover issues with any of the three crops.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Sugarbeet tolerance to overlapping residual herbicide programs

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location: Richville (SVREC)	**Application timings**: PRE (April 24), 2-lf beets (May 24), 6-8 lf beets (June 12)
Planting Date: April 24, 2019	**Herbicides:** see treatments
Soil Type: Clay loam	**O.M.:** 2.5 **pH:** 7.1
Replicated: 4 times	**Variety:** Crystal G675

Table 1. Comparison of sugarbeet tolerance of two-passes of overlapping residual herbicide programs applied POST alone and with ethofumesate (PRE) or a low rate of Dual II Magnum (PRE).

Herbicide treatments[a]		Injury[b] (14 DA-6-lf)	Harvest Stand	Yield	RWSA
PREs	***POST at 2- and 6-lf beets***	—%—	- #/100' row -	- ton/A -	— lb/A —
None	Roundup PowerMax (32/22 fl oz)	0	216	19.2	5666
None	Dual II Magnum (1/1 pt)	6	209	20.4	5808
None	Warrant (3/3 pt)	11	199	16.8	4844
None	Outlook (12/12 fl oz)	13	208	20.1	5753
None	Ethofumesate[a] (2/2 pt)	3	202	18.3	5647
Ethofumesate (2 pt)	Dual II Magnum (1/1 pt)	10	200	17.6	5015
Etho. (2 pt)	Warrant (3/3 pt)	10	194	17.3	5134
Etho. (2 pt)	Outlook (12/12 fl oz)	3	192	18.8	5588
Etho. (2 pt)	Ethofumesate[a] (2/2 pt)	18*	177	16.6	4691
Dual II Magnum (0.5 pt)	Dual II Magnum (1/1 pt)	8	171*	17.4	4759
Dual II Magnum (0.5 pt)	Warrant (3/3 pt)	14	179	17.7	4794
Dual II Magnum (0.5 pt)	Outlook (12/12 fl oz)	15*	184	18.3	4787
Dual II Magnum (0.5 pt)	Ethofumesate[a] (2/2 pt)	13*	169*	17.8	5082
$LSD_{0.05}$[c]		*14.6*[c]	*43.5*	*- NS -*	*- NS -*

[a] Roundup PowerMax was included in all postemergence treatments at the rates listed in the first treatment. These treatments also included AMS at 17 lb/100 gal. All POST applications of ethofumesate was applied with 1.5 pt/A of Destiny HC.
[b] Injury, stand, yield and RWSA data with asterisks (*) are significantly different from the Roundup PowerMax alone control.
[c] Means within a column greater than least significant difference (LSD) value are different from each other.

Summary: Overlapping residual herbicide programs may be the only way to effectively control glyphosate-resistant pigweed (waterhemp and Palmer) in sugarbeet. This is the second year, where a field trial was conducted at the Saginaw Valley Research and Extension Center to determine what effect multiple applications of residual herbicides have on sugarbeet injury, stand, yield and recoverable white sugar per acre (RWSA). The Group 15 herbicides, Dual II Magnum, Outlook and Warrant were all evaluated at maximum rates allowed per season. These treatments were also evaluated after a preemergence application of ethofumesate or Dual II Magnum at a low rate (currently not labeled). Postemergence ethofumesate was also evaluated. Sugarbeet injury was greatest when Ethofumesate was applied 3-times, or when Outlook or Ethofumesate followed PRE Dual II Magnum. Over the two years of this research none of these treatments resulted in a loss of yield or RWSA. These treatments were also examined for waterhemp control and should be continues to be examined over more environments.

MICHIGAN STATE UNIVERSITY EXTENSION

Michigan State University AgBioResearch

Waterhemp control with overlapping residual herbicide programs

Christy Sprague, Gary Powell and Brian Stiles, Michigan State University

Location: Isabella County	**Application timings**: PRE (July 8), 2-lf beets (July 25), 6-8 lf beets (August 7)
Planting Date: July 8, 2019	**Herbicides:** see treatments
Soil Type: Sandy loam	**O.M.:** 2.5 **pH:** 7.1
Replicated: 4 times	**Variety:** Crystal G675

Table 1. Comparison of sugarbeet tolerance of two-passes of POST overlapping residual herbicide programs alone and with ethofumesate (PRE) or low rates of Dual II Magnum (PRE).

		Waterhemp control[b]		
Herbicide treatments[a]		**August 8 (14 DA-2-lf)**	**August 21 (14 DA-6-lf)**	**September 11 (35 DA-6-lf)**
PREs	***POST apps. at 2- and 6-lf beets***	—%—	—%—	—%—
None	Roundup PowerMax (32/22 fl oz)	3	20	0
None	Dual II Magnum (1/1 pt)	9	39	39
None	Warrant (3/3 pt)	30	43	48
None	Outlook (12/12 fl oz)	13	40	40
Ethofumesate (2 pt)	Dual II Magnum (1/1 pt)	61	68	62
Etho. (2 pt)	Warrant (3/3 pt)	82*	93*	89*
Etho. (2 pt)	Outlook (12/12 fl oz)	71	78	75
Etho. (2 pt)	Ethofumesate[a] (1/1 pt)	75	88*	90*
Dual II Magnum (0.5 pt)	Dual II Magnum (1/1 pt)	66	70	68
Dual II Magnum (0.5 pt)	Warrant (3/3 pt)	86*	95*	93*
Dual II Magnum (0.5 pt)	Outlook (12/12 fl oz)	75	88*	80
Dual II Magnum (0.5 pt)	Ethofumesate[a] (1/1 pt)	86*	98*	100*
$LSD_{0.05}$[c]		*8*[c]	*10.5*	*13*

[a] Roundup PowerMax was included in all postemergence treatments at the rates listed in the first treatment. These treatments also included AMS at 17 lb/100 gal. All POST applications of ethofumesate was applied with 1.5 pt/A of Destiny HC.
[b] Waterhemp control evaluations with asterisks (*) are similar to the best waterhemp control treatment.
[c] Means within a column greater than least significant difference (LSD) value are different from each other.

Summary: Overlapping residual herbicide programs may be the only way to effectively control glyphosate-resistant pigweed (waterhemp and Palmer) in sugarbeet in the future. A field trial was conducted at a location in Isabella County with a high natural population of glyphosate- and ALS-resistant waterhemp. Several Group 15 herbicides, Dual II Magnum, Outlook and Warrant were evaluated at maximum rates allowed per season. These treatments were also evaluated after a preemergence application of ethofumesate or Dual II Magnum at a low rate (currently not labeled). Unfortunately, due to the extremely wet spring we were not able to establish this trial until late in the growing season. However, since waterhemp is a late emerging weed we were still able to get some excellent waterhemp control results. Effective waterhemp control at the end of the season (Sept. 11 evaluation) was variable (ranging from 89-100%) but was greatest when PRE Ethofumesate was followed by two POST applications of Warrant or Ethofumesate. Additionally, when Dual II Magnum at 0.5 pt PRE followed by two POST applications of Warrant or Ethofumesate were also effective. We will continue to examine and refine waterhemp control strategies in sugarbeet.

Effect of Harvest Date on Sugarbeet Yield, Quality and Grower Income

Average of 4 Locations - 2019

Trial Quality: Good

Variety: B - 1606N

Planted: Blum - April 10, Gerstenberger - May 15, Sylvester - May 8, and Maurer - May 15

Harvested: See trts.

Plots: 6 rows X 38 ft, 4 and 5 reps

Rhizoc Level: Low

Cerc Control: Very Good

Seeding Rate: 4.5 inches

Row Spacing: 22 inches

No.	Harvest Date	Net $/A	RWSA	RWST	T/A	% SUC	% CJP	Beets/ 100'
4	October 1	**$2,021**	**9958**	262	**38.4**	17.4	**96.0**	**205.9**
3	September 15	**$2,006**	8648	281	31.2	18.5	**96.1**	**202.0**
5	October 15	$1,784	**10393**	262	**39.5**	17.5	**95.9**	**211.8**
2	September 1	N/A	6725	278	24.3	18.8	94.7	**206.8**
1	August 15	N/A	5152	274	18.9	18.6	95.0	199.6
Average		$1,937.3	7924.5	271.5	30.43	18.18	95.54	205.21
LSD 5%		81.9	1626.2	N.S.	3.55	N.S.	0.84	10.68
CV %		2.3	13.2	5.6	7.5	5.6	0.6	3.3

Comments: Harvest date trials in 2019 were complicated by wet spring conditions, dry summer conditions, and very wet fall conditions. Some locations and dates were not able to be harvested because of the amount of precipitation. The revenue calculations for the earliest dates, August 15 and September 1, are not available. This is because the new early delivery premiums take the average of grower yield and RWST into consideration when calculating, and early delivery had not yet started at those dates. Typically, later harvest dates of November 1 and November 15 are also completed, but the conditions during the harvest of 2019 did not allow those harvest dates. Seasonal growing conditions provided lower than expected yields but higher than expected RWST at the early harvest dates. Rainfall during late September and early October allowed significant gains in yield, but also caused a decrease in RWST as plants rehydrated after a long dry period. When locations were averaged, the Net $/A was higher for the September 15 and October 1 harvest date than the October 15 harvest date.

Net $/A: Gross payment unless noted as net. Calculated assuming a $45 payment and a company average RWST.

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

Effect of Havest Date on Sugarbeet Yield, Quality and Grower Income

Blumfield West, Richville - 2019

Trial Quality: Good
Variety: B - 1606N
Planted: April 10
Harvested: See trts.
Plots: 6 rows X 38 ft, 5 reps
Row Spacing: 22 inch

Soil Info: Sandy Clay Loam
% OM: 2.5 **pH:** 7.8 **CEC:** 10.9
P: Above opt **K:** Above opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Radish

Rhizoc Level: Low
Cerc Control: Very Good
Problems: None
Seeding Rate: 4.5 inches

No.	Harvest Date	Net $/A	RWSA	RWST	T/A	% SUC	% CJP	Beets /100ft	GDD*	Rain Inch**
3	September 15	**$1,927**	8279	**291**	28.4	18.9	**96.8**	**241.7**	30	21.9
4	October 1	**$1,866**	**8993**	257	**35.0**	17.1	**96.2**	**242.2**	31	27.0
5	October 15	$1,626	**9436**	262	**35.2**	17.4	95.9	**245.8**	18	29.5
1	August 15	N/A	6321	**296**	20.6	**19.9**	94.9	229.8	36	19.6
2	September 1	N/A	6955	**292**	23.1	**19.8**	94.5	**241.6**	32	20.3
Average		$1,806.5	7998.9	279.5	28.48	18.62	95.66	240.21	29.4	23.6
LSD 5%		116.5	553.6	8.9	2.43	0.56	0.74	12.24		
CV %		5.0	5.8	2.7	7.1	2.5	0.6	4.2		

***GDD** (Growing Degree Days): an average daily amount for the 2 weeks prior to that harvest date.

****Rain Inch:** Actual rainfall amount including 2 weeks prior to the planting date.

Comments: The Blumfield area was impacted by significant early and late rainfalls, with a drought period in between. The dry period allowed the plants to dehydrate and increase in sugar content and RWST. Root yield increased very rapidly once rains came in late September, gaining as much as 7 tons in two weeks. The sugar content and RWST saw a sharp decline at the later harvest dates due to the rehydration of the crop.

Net $/A: Gross payment unless noted as net. Calculated assuming a $45 payment and a Company average RWST.

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

Gerstenberger, Sandusky - 2019

Trial Quality: Good
Variety: B - 1606N
Planted: May 15
Harvested: See trts.
Plots: 6 rows X 38 ft, 5 reps
Row Spacing: 22 inch

Soil Info: Loam
% OM: 2.6 **pH:** 7.4 **CEC:** 9.8
P: Above Opt **K:** Above Opt
Mn: Medium **B:** Low
Added N: 155 lbs
Prev Crop: Corn

Rhizoc Level: Low
Cerc Control: Very Good
Problems: None
Seeding Rate: 4.5 inches

No.	Harvest Date	Net $/A	RWSA	RWST	T/A	% SUC	% CJP	Beets /100ft	GDD*	Rain Inch**
4	October 1	**$2,324**	11255	245	46.0	16.5	**95.5**	**208.4**	30	19.6
3	September 15	**$2,315**	10048	**255**	39.3	**17.0**	**95.9**	**215.6**	30	17.1
5	October 15	$2,043	**12537**	**257**	**48.8**	**17.3**	**95.3**	**215.7**	17	22.2
2	September 1	N/A	7122	246	28.9	**17.1**	93.8	202.3	30	14.0
1	August 15	N/A	5055	233	22.3	16.2	94.1	200.5	33	13.0
Average		$2,227.1	8199.9	247.3	37.06	16.83	94.93	208.51	27.9	17.2
LSD 5%		133.7	553.1	9.6	1.54	0.52	0.84	11.88		
CV %		5.2	5.6	3.2	3.8	2.6	0.7	4.7		

***GDD** (Growing Degree Days): an average daily amount for the 2 weeks prior to that harvest date.

****Rain Inch:** Actual rainfall amount including 2 weeks prior to the planting date.

Comments: The Sandusky trial location was not subject to as prolonged of a dry period as the other trial locations. Ample seasonal rainfall, along with high soil fertility created very good root yields, but also lower than average sugar content and RWST. Both root yield and RWST tended to increase over time, similar to other years test results. This trial was disease free and had an excellent stand.

Net $/A: Gross payment unless noted as net. Calculated assuming a $45 payment and a Company average RWST.

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

Effect of Harvest Date on Sugarbeet Yield, Quality and Grower Income

Maurer, Ruth - 2019

Trial Quality: Good
Variety: B - 1606N
Planted: May 15
Harvested: See trts.
Plots: 6 rows X 38 ft, 5 reps
Row Spacing: 22 inches

Soil Info: Sandy Clay Loam
% OM: 3.8 **pH:** 7.6 **CEC:** 13.9
P: Above Opt **K:** Above Opt
Mn: High **B:** Medium
Added N: 135 lbs.
Prev Crop: Corn

Rhizoc Level: Low
Cerc Control: Very Good
Problems: None
Seeding Rate: 4.5 inches

No.	Harvest Date	Net $/A	RWSA	RWST	T/A	% SUC	% CJP	Beets/ 100ft	GDD*	Rain Inch**
4	October 1	**$2,087**	**10054**	261	**38.6**	17.3	96.2	184.2	29	21.4
3	September 15	**$2,031**	8760	**277**	31.7	**18.2**	96.3	168.7	28	19.8
5	October 15	$1,859	**10501**	**266**	**39.5**	**17.8**	95.5	189.5	17	23.0
2	September 1	N/A	6389	257	24.8	17.1	95.8	189.5	30	15.8
1	August 15	N/A	4301	258	16.7	**17.7**	95.7	188.4	34	14.0
Average		$1,992.4	8000.9	263.8	30.28	17.63	95.89	184.06	28	18.8
LSD 5%		202.6	809.1	14.5	3.24	0.70	N.S.	N.S.		
CV %		7.0	7.5	4.1	8.0	3.0	0.9	9.0		

***GDD** (Growing Degree Days): an average daily amount for the 2 weeks prior to that harvest date.

****Rain Inch:** Actual rainfall amount including 2 weeks prior to the planting date.

Comments: The Ruth location was not as dry as some of our other locations throughout the summer months. RWST and sugar content were impacted by each rain event differently, but yield increased at each successive harvest date. High root yield and good sugar content were achieved at the later harvest dates.

Net $/A: Gross payment unless noted as net. Calculated assuming a $45 payment and a company average RWST.

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

Sylvester, Quanicassee - 2019

Trial Quality: Good
Variety: B - 1606N
Planted: May 8
Harvested: See trts.
Plots: 6 rows X 38 ft, 4 reps
Row Spacing: 22 inches

Soil Info: Clay Loam
% OM: 6.0 **pH:** 8.0 **CEC:** 19.6
P: Above Opt **K**: Above Opt
Mn: High **B:** Medium
Added N: 155 lbs.
Prev Crop: Wheat

Rhizoc Level: Low
Cerc Control: Very Good
Problems: None
Seeding Rate: 4.5 inches

No.	Harvest Date	Net $/A	RWSA	RWST	T/A	% SUC	% CJP	Beets/ 100ft	GDD*	Rain Inch**
3	September 15	$1,752	7505	**299**	25.1	**19.9**	95.5	182.0	31	18.1
5	October 15	$1,610	**9100**	265	**34.3**	17.3	**96.9**	196.2	18	27.4
2	September 1	N/A	6426	**317**	20.3	**21.3**	94.8	193.8	33	15.3
1	August 15	N/A	4929	**310**	15.9	**20.7**	95.2	179.6	35	14.8
4	October 1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	31	21.7
Average		$1,681.4	6989.8	297.9	23.92	19.80	95.58	187.90	30	19.5
LSD 5%		N.S.	897.9	21.7	2.77	1.39	1.05	N.S.		
CV %		7.9	8.0	4.6	7.2	4.4	0.7	7.2		

***GDD** (Growing Degree Days): an average daily amount for the 2 weeks prior to that harvest date.

****Rain Inch:** Actual rainfall amount including 2 weeks prior to the planting date.

Comments: This Quanicassee trial was very highly impacted by a dry period during the summer months. Precipitation during September increased yield dramatically while also reducing sugar content. Weather impacts did not allow us to harvest a sample on October 1.

Net $/A: Gross payment unless noted as net. Calculated assuming a $45 payment and a company average RWST.

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

Population Trial

Sylvester Farms, Quanicassee - 2019

Trial Quality:	Excellent	**Soil Type:**	Loam	**Cerc Control:**	Excellent control: See below for materials
Variety:	B-149N	**Fertilizer:**	Fall: P & K; 2x2: 10 gal 28%, 6 gal 10-34-0, 2 gal Thio, Mn & B; PPI: 40 gal 28%, 4 gal Thio	**Rhiz Control:**	Excellent control: Quadris I.F. (10 oz + Mustang), 8-10 leaf (10 oz)
Planted:	April 9				
Harv/Samp:	Oct 15 / Oct 14				
Plot Size:	5 reps	**Prev Crop:**	Wheat / radish		
Row Spacing:	24 inch	**Weather:**	Wet early, dry July and August, good after mid-September	**Other Pests:**	Sugarbeet cyst nematode
Seeding Rate:	See treatments				

Treatment	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Population 100 Ft. of Row 51 Days
48,000	$1,286	8725	270	32.3	17.7	96.5	170.6
55,000	$1,275	8805	270	32.6	17.8	96.3	193.2
62,000	$1,275	8949	272	32.9	17.8	96.5	204.8
Average	$1,279	8826	271	32.6	17.8	96.4	189.5
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	15.2
CV %	3.0	2.6	2.1	1.4	1.9	0.4	5.5

Comments: This is the second year that Sylvester Farms did a population trial. It is important to note that Sylvester Farms are in 24 inch rows. In 2018, there were two planting rates (55,000 and 62,000), and the trial had a very high emergence rate at about 87%. The 2018 results showed a significant tonnage increase for the 55,000 rate, but very close RWSA due to a statistically insignificant advantage in RWST for the 62,000 rate. In 2018, the seed cost savings gave the 55,000 rate about a $30 net return advantage.

In the trial this year, three rates were tested including 48,000, 55,000, and 62,000. There were no significant differences found for any metrics this year. There was an insignificant increase for tonnage and RWST as the planting rate increased. This insignificant increase in RWSA was not enough to keep up with the cost of seed nor was the net income return increased as planting rate went up over 48,000. The overall quality of this year's trial was excellent. Soil variability throughout the field was low. The average percent emergence across all planting rates was 75.3%, which is typical for sugarbeets. Sugarbeet cyst nematode was present, but radishes were planted in the field the year before and a nematode variety was used, both of which limited the impact of this parasite. Both Cercospora and Alternaria leafspot were found early in the trial (mid-June), but did not progress to the point of impacting yield. The leafspot program was as follows: 6/19 EBDC, 6/30 Propulse + Badge, 7/12 Super Tin + EBDC, 7/24 Provysol + EBDC, 8/7 Priaxor + EBDC, 8/16 Inspire XT + Badge, 8/30 Super Tin + EBDC, 9/17 Delaro + Badge. All sprays included a sticker.

$/A: Net dollars per acre assuming a $45 payment, a company average RWST of 270, and a $3.50/1000 seed cost. Does not include early delivery.
Bold: Results are not statistically different from top ranking treatment in each column.

Population Trial

Meylan Farms, Linwood - 2019

Trial Quality: Excellent
Variety: B-1399
Planted: April 26
Harv/Samp: Nov 5 / Oct 21
Plot Size: 4 reps
Row Spacing: 22 inch
Seeding Rate: See treatments

Soil Type: Loam
Fertilizer: 2x2: 10 gal of 28%, 7 gal 10-34-0, 3 gal of thiosul; PPI: 40 gal 28%
Prev Crop: Wheat
Weather: Wet early, dry July & August, wet fall

Rhiz Control: Excellent control: Quadris I.F. (8 oz + 4 oz Mustang) & 6-8 Leaf (14 oz)
Cerc Control: Excellent control: See comments for materials
Other Pests: Sugarbeet cyst nematode

Treatment	Net $/A	RWSA	RWST	T/A	% Sugar	% CJP	Population 100 Ft. of Row 38 Days
55,000	$923	6693	274	24.4	18.0	96.7	183.0
63,000	$900	6721	277	24.2	18.1	96.8	220.5
Average	$911	6707	276	24.3	18.0	96.8	201.8
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	18.9
CV %	2.3	1.9	0.7	1.8	0.8	0.1	4.2

Comments: The overall quality of this trial was excellent. Soil variability throughout the field was low, and plant emergence was exceptional, with the average percent emergence across all planting rates being 81.1%. The goal of this trial was to see if it would be possible to lower the planting rate without having a significant impact on yield, thus allowing for increased revenue through decreasing seed costs. While no significant difference in yield was found between the three populations tested, there also was no significant difference in revenue after including the difference in seed cost ($3.5/1000 seeds). The leafspot program was as follows: 6/23 EBDC, 7/1 Minerva + EBDC, 7/16 Super Tin + Kocide, 7/30 Provysol + EBDC, 8/13 Super Tin + Badge, 8/26 Delaro + Proline + EBDC, 9/15 EBDC + Kocide. All sprays included a spreader/sticker.

$/A: Net dollars per acre assuming a $45 payment, a company average RWST of 270, and a $3.50/1000 seed cost.

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

Variable Planting Rate

D & B Karg Farms, Harbor Beach - 2019

Trial Quality:	Very good	**Soil Type:**	Loamy sand to loam	**Rhiz Control:**	Excellent control: Quadris I.F. (7 oz) & 8 leaf (14 oz)
Variety:	C-G675	**Fertilizer:**	2x2: 48#-50#-26-14#S-6#Ca-3.3#Mg-1.3#Zn-3#Mn-1#B; S.D. 33 gal of 28%	**Cerc Control:**	Excellent control: See comments for materials
Planted:	May 12				
Harv/Samp:	Nov 8 / Oct 17				
Plot Size:	7 reps	**Prev Crop:**	Wheat / Radish		
Row Spacing:	22 inch	**Weather:**	Wet early, dry July & August, wet fall	**Other Pests:**	N/A
Seeding Rate:	58,000				

Treatment	Gross $/A	RWSA	RWST	T/A	% Sugar	% CJP	Population 100 Ft. 43 Days
Variable Rate 39,000 - 59,000	$1,330	7977	289	27.6	19.4	95.0	163.8
58,000	$1,321	7928	290	27.3	19.4	95.2	212.6
Average	$1,325	7953	289	27.5	19.4	95.1	—
LSD 5%	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	—
CV %	1.2	1.2	1.5	2.0	1.3	0.4	—

Comments: With the increase in implementation of precision agriculture, there is an interest in variable rate seeding across different soil types. To explore this concept, this trial was designed as a preliminary investigation of the possible benefits of variable rate seeding. There were no significant differences found for yield or quality. The revenue reported is the gross dollars per acre and does not deduct the seed cost. At some areas of the field, the planting rate was as much as 19,000 seeds per acre less than the static rate of 58,000. At a cost of approximately $3.50 per 1,000 seeds, there is a potential benefit of substantial seed cost savings. The leafspot materials were as follows: 1. EBDC, 2. Inspire XT + EBDC, 3. Super Tin + Topsin + EBDC, 4. Delaro + EBDC, 5. Super Tin + EBDC, 6. Topguard + EBDC.

$/A: Gross dollars per acre assuming a $45 payment and a company average RWST of 270. No seed costs were deducted.

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

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