



MICHIGAN SUGARBEET REACH

Research & Education Advisory Council

Management Guidelines for Controlling Cercospora Leafspot in Sugarbeets 2015

Cercospora leafspot (*Cercospora beticola*) is the most serious foliar disease of sugarbeets in our growing region. Uncontrolled Cercospora can cause yield losses of 5 or more tons per acre and reduce sugar levels by up to 3 percentage points. Yield and quality losses can be serious when leaves have 1 or more spots per square inch.

Significant progress has been made in controlling Cercospora in Michigan from improvements in BEETcast, more tolerant varieties, advances in spray technology and more knowledgeable growers. However, the development of resistance to strobilurin fungicides (Headline and Gem) has made leaf spot control more difficult.

DISEASE DEVELOPMENT

Cercospora leafspot overwinters in the soil on decomposing beet leaves from previous sugarbeet crops and on weed residues. When conditions are favorable (**high temperatures and humidity**) spores are produced and are blown onto or splashed on sugarbeets leaves where the spores germinate and infect the leaves. The disease grows inside the leaf and begins breaking down cell tissue, creating necrotic spots. The sugarbeet's natural defenses "wall off" the damaged tissue and limit the size of spots to about 1/8 inch in diameter. The centers of spots appear ashen grey with tiny black dots (Figure 1) and a dark brown to purple ring forms around the spot. Spores from these "dots" are released which re-infect the plants. **Daytime temperatures between 75 - 90 degrees F with night temperatures above 60 degrees, coupled with wet leaves (from dew or rain) for 10-12 hours or more create Cercospora infections. Temperatures approaching 95 degrees slow Cercospora development significantly.** It generally takes about a week to 10 days for spots to form after the leaves are infected. Newly formed spots are very small but increase in size within 2-3 days. Without control measures entire leaves can become covered with spots which merge together killing large sections of leaves or entire leaves (Figure 2).

Figure 1 - Black fruiting bodies



Figure 2 - Damaged



MANAGEMENT STRATEGIES

Effective control of Cercospora leafspot in sugarbeets requires an integrated and intensive approach. The following factors should be considered when developing a Cercospora leaf spot control program:

- 1. Crop Rotation:** A longer rotation will benefit your Cercospora control program. Common weeds such as pigweed and lambsquarter also harbor the disease so they need to be controlled in rotational crops.
- 2. Variety Selection:** Many approved varieties have good Cercospora tolerance, however, some varieties (i.e. nematode tolerant) are susceptible to Cercospora (Table 1) and need more intensive management.
- 3. Cercospora Risk Zones:** We have 3 distinct Cercospora Risk Management Zones (Table 2). Red Zones have a high risk of Cercospora infestations, Yellow Zones are at a moderate zone and Green Zones have a lower disease risk. Growers in Red Zones need to pay particular attention to Cercospora, especially when planting susceptible varieties.
- 4. Fungicides:** The supply of effective fungicides are limited (Table 3). Triazole fungicides (Inspire XT, Eminent VP, Minerva, Proline, Enable and Topguard) are the most effective fungicides available for Cercospora control in sugarbeets. Eminent VP and Minerva are essentially the same

product, however, Minerva Duo is a mixture of Minerva and Super Tin. Triazoles are absorbed by the plant and are rain-fast when dried on the leaf. Triazoles move within the leaf and protect the upper and lower surfaces, however, they do not move from leaf to leaf. Always tank mix triazole fungicides with an EBDC or copper and rotate fungicide classes properly. Protectant fungicides (Super Tin, EBDC's and Coppers) are not absorbed by the leaves and are susceptible to being washed off by rainfall. Spray coverage is more important for protectants because they are not systemic. Super Tin (a protectant) is somewhat inferior to the triazole fungicides but is significantly better than the other protectants (EBDC's and Coppers). The EBDC's (Manzate, Dithane, etc.) will control Cercospora but do not have long residual activity and are most useful in tank mixes and as alternate sprays so that Triazoles and Super Tin are not used back to back. Coppers are similar to the EBDC's. The EBDC's and Coppers are more likely to plug sprayers than are Super Tin and the triazoles. Some Copper formulations mixed with Glyphosate have caused leaf burning issues. The strobilurin fungicides (Headline and Gem) and Topsin M have high levels of resistance and are not recommended.

5. Application Timing: To provide effective Cercospora leaf spot control, fungicide applications need to be applied before spots appear on leaves. Yield losses will likely occur if the initial application is delayed until after spots are found in the general area of the field. The BEETcast predictive model has been effective in timing the initial application 7 to 14 days before spots appear. Spots normally occur in the low 70's DSV range in Red Zones, in the low 80's in Yellow Zones and in the late 80's to early 90's in Green Zones. BEETcast has been effective in predicting 1st spot and for timing the first leafspot application. Fifty weather stations throughout the growing region provide leafspot spray recommendations (and other information) for the Cooperative. Daily and cumulative disease severity values (DSV's) are posted on the website www.MichiganBeets.com. A risk management map shows the Cercospora risk for different parts of the growing region. This map is color coded with Red = high risk; Yellow = moderate risk and Green = lower risk. Follow-up applications should be determined by using BEETcast DSV's or by following the pesticide label (see Table 2).

APPLICATION TECHNIQUES

Good spray coverage is needed to provide adequate leaf spot control. Sprayers should put out at least

20 gpa and pressure should be near 100 psi. Aerial applications provide effective leafspot control. Cercospora fungicide applications are less effective when spraying wilted beets or leaves that are wet enough to cause the fungicide to run off. Spraying upright leaves (not wilted) that are dry or only slightly wet will provide better results. Protectant fungicides need better coverage than fungicides that penetrate into the leaves (i.e., triazoles).

Table 1. Variety Tolerance to Cercospora

Variety	Tolerance
C-RR288	Very Good
B-1399	Very Good
C-RR202	Good
HM-NT425RR	Good
HM-173RR	Good
HM-28RR	Fair - Good
C-G351NT	Fair - Good
C-RR059	Fair - Good
B-18RR4N	Fair
B-133N	Fair
SX-1211NRR	Fair
SX-1212RR	Fair
B-12RR2N	Poor - Fair
SX-1228RR	Poor - Fair
B-19RR1N	Poor
SX-1235NRR	Poor
C-G333NT	Poor
C-RR074NT	Poor

RESISTANCE MANAGEMENT

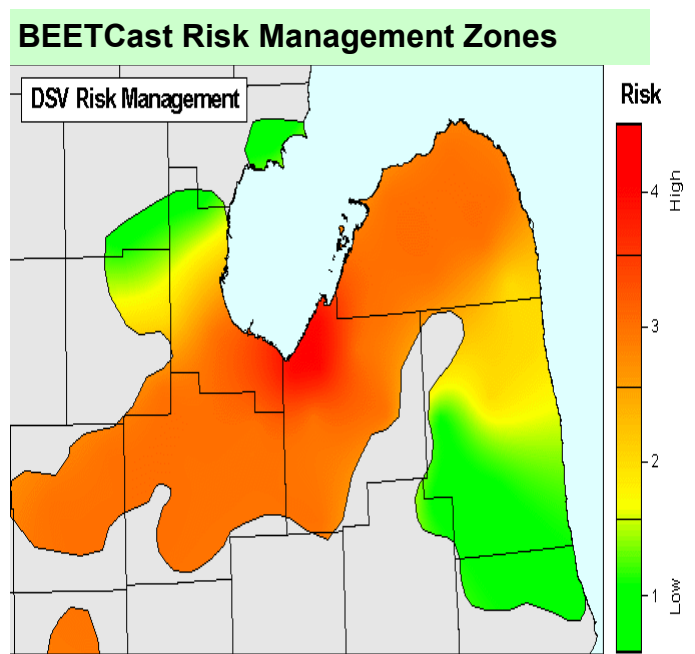
In order to maintain the effectiveness of the fungicides that we depend upon, **the same fungicide class should never be applied back to back. It is important to tank mix triazole fungicides with EBDC's or Copper.** Utilizing Super Tin in the rotation will make it possible to follow a sound resistance management program. The best strategy is to use each fungicide class only once in your leafspot spray program. Cercospora has developed resistance to Headline and Gem (strobilurin fungicides) and to Topsin M. To reduce the chance of more fungicides becoming resistant, **tank mixing and alternating fungicide types is essential.. NEVER** apply the same fungicide(s) or fungicide classes consecutively.

Table 2: Cercospora Fungicide Application Guidelines Utilizing BEETcast and/or Label Days

Red Zone (High Cercospora Risk)			
Variety:	Tolerant	Moderate	Susceptible
Start:	55 DSV	50 DSV	45-50 DSV
Reapply (DSV's or Number of Days)			
Triazoles*	45 14-21 Day	40 14-19 Day	35 14-16 Day
Tin	40 10-14 Day	35 10-12 Day	30 10 Day
EBDC/ Copper	25 7-10 Day	15-20 7-8 Day	15 7 Day

Yellow Zone (Medium Cercospora Risk)			
Variety:	Tolerant	Moderate	Susceptible
Start:	60 DSV	55 DSV	50 DSV
Reapply (DSV's or Number of Days)			
Triazoles*	55 14-21 Day	50 14-19 Day	45 14-16 Day
Tin	50 10-14 Day	45 10-12 Day	40 10 Day
EBDC/ Copper	20 7-10 Day	15-20 7-8 Day	15 7 Day

Green Zone (Lower Cercospora Risk)			
Variety:	Tolerant	Moderate	Susceptible
Start:	65 DSV	60 DSV	55 DSV
Reapply (DSV's or Number of Days)			
Triazoles*	60 14-21 Day	55 14-19 Day	50 14-16 Day
Tin	55 10-14 Day	35-50 10-12 Day	40 10 Day
EBDC/ Copper	30 7-10 Day	20 7-8 Day	15 7 Day



*Inspire, Topguard, Proline, Eminent, Enable, Minerva

SPRAY PROGRAMS: Depending on: BEETcast risk management zone, Cercospora variety resistance, fungicides selection, application timeliness, a number of effective spray programs combinations can be utilized. Suggested effective spray programs from MICHIGAN SUGAR would be:

Three applications-(1) Triazole +EBDC or Copper (2) Tin +EBDC (3) Triazole +EBDC or Copper

Four applications- (1) Triazole +EBDC or Copper (2) Tin +EBDC (3) EBDC *alone (4) Triazole +EBDC or Copper

Five applications- (1) Triazole +EBDC or Copper (2) Tin +EBDC or Copper (3) EBDC *alone (4) Triazole +EBDC or Copper (5) EBDC alone

*Depending on the level of resistance a tank mix partner with a strobilurin or a biological (Ballad Plus) may or may not improve effectiveness of an EBDC alone.

Table 3. Fungicides Information for Cercospora Leafspot Control

Fungicide	Formulation	Fungicide Class	Rate/A	Control Rating	Re-Entry (hours)	PHI (days)
Inspire XT	EC	Triazole	7 fl oz	Good +	12	21
Topguard	EC	Triazole	10-14 fl oz	Good +	12	21
Minerva Duo	SC	Triazole/Tin	16 fl oz	Good +	48	21
Minerva/Eminent VP	SL	Triazole	13 fl oz	Good	12	14
Proline + NIS	SC	Triazole	5.7 fl oz	Good	48	7
Enable + Dithane + COC	EC	Triazole	8 fl oz	Good	12	14
Headline	EC	Strobilurin	9.2 fl oz	*Resistance	12	7
Gem	SC	Strobilurin	3.6 fl oz	*Resistance	12	21
Topsin M	FL	Benzimidazole	20 fl oz	*Resistance	12	21
Super Tin/ Agri Tin	FL	Tin	8 fl oz	Good -	48	21
Super Tin/ Agri Tin	WP	Tin	5 oz	Good -	48	21
Manzate***	FL	EBDC	1.6 qt	Fair	24	14
Dithane***	FL	EBDC	1.6 qt	Fair	24	14
Koverall	DF	EBDC	2 lb	Fair	24	14
Penncozeb	DF	EBDC	2 lb	Fair	24	14
Cuprofix**	DF	Copper	2 lb	Fair	48	0
Kocide 3000**	DF	Copper	2 lb	Fair	24	0
Champion**	DF	Copper	2 lb	Fair	48	0
Badge SC**	SC	Copper	2.1 pt	Fair	48	0
AGRILIFE**	Sol	Copper	38 fl oz	Fair	48	0
Ballad Plus	SC	Biological	2 - 4 qt	Fair -	4	0

* Not Recommended. High levels of resistance exist throughout our growing region—however, the level of resistance will not be the same for all fields

** Some Copper products cause leaf injury when mixed with Glyphosate (not recommended)

*** Dry flowable formulations are available (2lbs/acre)