MICHIGAN SUGARBEET REACh

Research & Education Advisory Council

Management Guidelines for Controlling Cercospora Leafspot in Sugarbeets

Description of the Problem

Cercospora leafspot (*Cercospora beticola*) is the most serious foliar disease of sugarbeets in the Michigan Sugar Company growing region. When the disease is not properly controlled severe yield and sucrose losses can occur. Economic damage occurs when the leaf area has approximately one spot per square inch. Cercospora infestation levels vary considerably across the Michigan Sugar Company growing area.

Significant progress has been made in controlling Cercospora in Michigan with the introduction of triazole and strobilurin fungicides and with the adaptation of the BEETcast™ prediction model.

Disease Symptoms

The fungus overwinters in the soil on decomposing beet leaves from previous sugarbeet crops. The fungus also infects common weeds such as pigweed and lambsquarter. When conditions are favorable **(high temperatures and humidity)** spores will be produced which are deposited onto sugarbeet leaves by wind and splashing rain. Germinating spores enter the leaf surface through stomata (tiny holes in leaves). Inside the leaf, spores reproduce and release a toxin which causes cells to leak their sap, producing a necrotic spot. These spots are typically limited to about 1/8 inch in diameter by the sugarbeet's natural defenses which "wall off" the damaged tissue. This creates a dark brown to purple ring around the spot. Active spots (fungus reproducing) appear ashen grey with small black dots (stromata) scattered throughout *(Fig.1).* These stromata will release spores which re-infect the leaf. Cercospora tolerant varieties are able to slow down lesion development and reduce the number of spores released.

Daytime air temperatures of 75 to 90 degrees F with night temperatures above 60 degrees, coupled with wet leaves (from dew or rain) for 10 hours or more will facilitate Cercospora infections. After a leaf is infected it takes from 5 days to 3 weeks for spots to develop, depending upon conditions. The first visible signs of infection are very small whitish spots, which increase in size within a few days. Without control measures the entire leaf can become covered with spots which will grow together. Badly damaged leaves will turn yellow, then brown and die but will remain attached to the crown *(Fig. 2).*

Fig. 1 - Black fruiting bodies

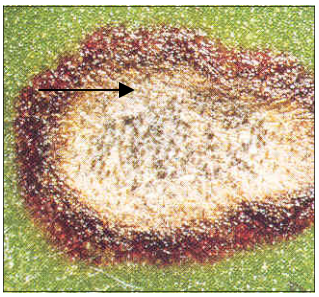


Fig. 2 - Damaged leaves

Management Strategies

Effective control of Cercospora leafspot in sugarbeets requires an integrated and intensive approach. A three or more year rotation can reduce the inoculum load. Planting sugarbeet varieties which have tolerance to Cercospora leafspot will help reduce the problem. Sugarbeet varieties grown in Michigan have a wide range of tolerance to Cercospora.

Cultivar Resistance to Cercospora Leafspot			
Crystal RR840	Good	HM 110RR	Fair
BTS 18RR26	Good	SX 1260RR	Fair
HM 50RR	Good -	HM 39RR	Fair -
HM 42RR	Good -	BTS 18RR06	Fair -
HM 131RR	Good -	Crystal RR808	Poor
SX 1281RR	Fair +	BTS 17RR32	Poor
HM 133RR	Fair +	Crystal RR827	Poor
HM 27RR	Fair +	Crystal RR824	Poor
HM 28RR	Fair +	BTS 18RR4N	Poor
HM 29RR	Fair +	——	——

Control with Fungicides

Both systemic and contact fungicide options are available to control Cercospora leafspot in sugarbeets. Systemic compounds give longer control compared to contact fungicides. Contact (protectants) compounds must be applied more often, but are less costly *(Table 1).* The most effective products are: Inspire XT (*triazole*), Eminent (*triazole*), Headline (*strobilurin*), Proline (*triazole*) and Gem SC (*strobilurin*). These fungicides will penetrate into the leaves and move small distances. Eminent will also translocate within the leaf but will not move to other leaves. Triazole and strobilurin fungicides are generally rain fast within 1 to 2 hours. Contact type fungicides such as Super Tin, Dithane, Penncozeb, Manzate (EBDCs) and Kocide (*copper*) are less effective but are also less expensive and may be useful for resistance management. Contact fungicides are prone to being washed off by rainfall. The triazole and strobilurin fungicides will also control powdery mildew in sugarbeets. If Quadris (*strobilurin*) has been used as a foliar spray for Rhizoctonia control it is recommended to use a triazole as the initial leafspot spray in that field. Control measures are normally justified until early-mid September, depending on environmental conditions and anticipated harvest date.

Coverage is critical with fungicide applications; fungicides need to penetrate to the new growth in the plant's crown. **Recent Michigan Sugar research indicates water rates of 20 gpa coupled with 100 to 120 PSI pump pressures (80 to 100 PSI at the nozzle) are best for fungicide applications, especially protectants.** An aerial (airplane) application can provide good protection (≥ 5 GPA). Always apply fungicides to dry leaf surfaces, reducing the likelihood of run off. Do not spray "FLAT" (dry-wilted) beets. Water sensitive paper can be used to check penetration into the sugarbeet canopy.

Economical threshold for chemical control is dependent on four conditions: **timing of infection, level of infection, weather forecast and variety**. Application timings can be made from BEETcast™. Begin scouting early planted fields with less tolerant varieties at canopy closure OR July 1st. Check places with little or no air movement first (i.e. next to cornfields, woodlots or creek bottoms). If the first Cercospora spot is visible anywhere in the field, it is economically justified to begin the first fungicide application. **TIMING OF FIRST SPRAY SHOULD NEVER BE DELAYED BEYOND FIRST SPOT IN THE FIELD.**

Table 1 — Cercospora Leafspot Fungicides

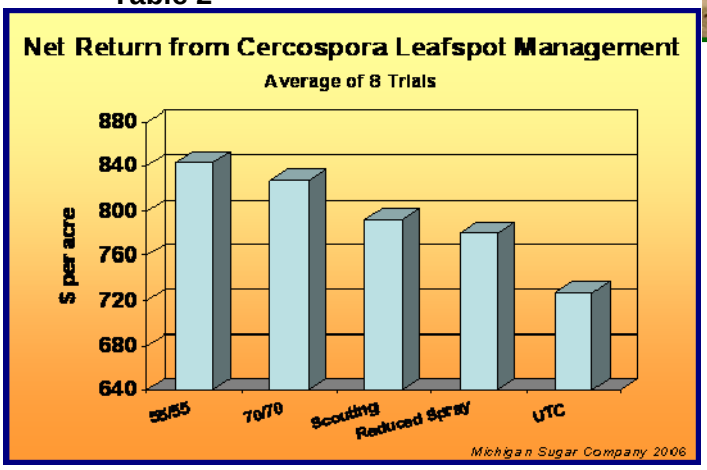
Fungicide	Type	Rate	Efficacy	Rainfast	Re-entry (hrs)	PHI (days)
Inspire XT	Triazole	7 fl oz	Good	1 hour	12	7
Eminent	Triazole	13 fl. oz.	Good	Dry	24	14
Headline	Strobilurin	9 fl oz	Good	Dry	12	7
Proline ★	Triazole	5.7 fl oz	Good	2 hour	48	21
Gem SC	Strobilurin	3.6 fl oz	Good	2 hour	12	21
Enable ★★	Triazole	8 fl oz	Fair +	Dry	12	14
Quadris	Strobilurin	9.6 oz	Fair +	4 hour	4	0
Super Tin	Tin	5 oz	Fair	★★★★	48	21
Agritin	Tin	5 oz	Fair	★★★★	48	21
Penncozeb	EBDC	2 lbs	Fair-	Dry	24	14
Dithane	EBDC	2 lbs	Fair-	Dry	24	14
Manzate	EBDC	2 lbs	Fair-	Dry	24	14
Kocide 3000	Copper	2 lbs	Fair-	Dry	24	0
Topsin M ★★★	Benzimiadole	8 oz	★★★	4 hours	12	21

★ Proline needs NIS
★★ Enable needs Dithane + COC
★★★ Topsin M - many fields have resistance; tank mix with another fungicide.
★★★★ Tins - nothing specified on label

BEETcast™

BEETcast™ is a Cercospora leafspot disease prediction model which is used to determine the optimum timing for fungicide sprays. The model uses temperature and leaf wetness to calculate disease severity values (DSVs). These values are reported daily and the accumulated numbers in conjunction with other factors are used to predict optimum spray dates. Table 2 illustrates the usefulness of the BEETcast™ model over a 5 year evaluation period.

Table 2



A risk management map can be found on the BEETcast™ website **www.MichiganBeets.com** showing the Cercospora risk for different parts of the growing region. The risk management map is color coded: Red = very high risk; Orange = high risk; Green = lower risk. The Yellow areas are transition zones between high risk and lower risk.

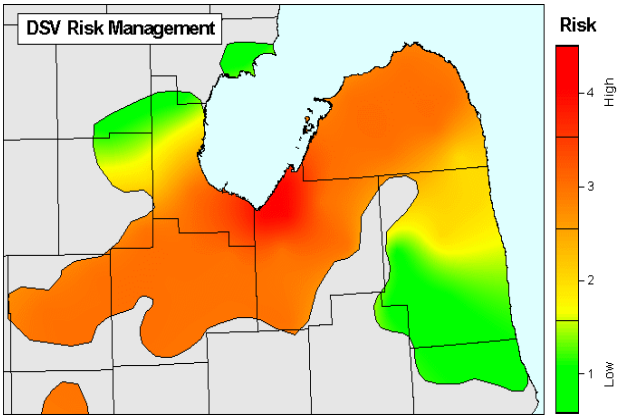
The application dates can be modified by variety. Highly susceptible varieties should be sprayed earlier (5 to 10 DSVs), especially for the initial application. The spray schedule can be relaxed somewhat if tolerant varieties are utilized. **Consult with your agriculturist to determine DSV triggers for your area.**

Resistance Management

Michigan growers are fortunate to have several very effective fungicides for control of Cercospora leafspot. In order to maintain the effectiveness of the products, it is recommended to always rotate fungicides and fungicide classes. The best strategy is to use each fungicide class only once in your leafspot spray program.

Currently fungicide resistance has been identified with Topsin (*benzimidazole*). To reduce the chance of Cercospora developing further fungicide resistance, apply Topsin only ONE time each year; Topsin must be tank mixed with unrelated type compounds such as EBDC, Tin or Copper. **NEVER** apply the fungicide(s) or fungicide classes consecutively. **If Quadris was applied for Rhizoctonia control after the four leaf stage, rotate to non-strobulurin fungicide for the first leafspot application.**

BeetCast Risk Management Zones



BEETcast™ Spray Recommendations by Region			
Risk Zone	**1st App.**	**2nd App.**	**3rd App.**
Red Zone	55 DSV	55 DSV	55 DSV
Orange Zone	55 DSV	55 DSV	55 DSV
Yellow Zone	70 DSV	55 DSV	55 DSV
Green Zone	80 DSV or 1st spot	55 DSV	55 DSV

BEETcast™
Growers in Michigan can access BEETcast™ on the website *www.MichiganBeets.com* and in Ontario on the website *www.weatherinnovations.com/beetcast.cfm*

Cercospora Leafspot Fungicide Summary
Always read and follow label directions!

1) The single most important Cercospora leafspot fungicide spray is the first one. Research indicates best timing of fungicide for both control and net revenue occurs just prior to the first spot being found.
2) The first application of fungicide should be applied according to the BEETcast™ DSV Risk Management map or when beets are nearly closing row. Begin scouting no later that July 1st.
3) Follow BEETcast™ DSV Spray recommendation intervals or label reapplication intervals if not utilizing BEETcast™.
4) Always rotate fungicide classes. Ideally do not use any chemistry more than once in a leaf spot spray program.
5) Fungicides with contact mode of action (i.e. TPTH, EBDC and Copper) are most effective with thorough coverage and applied prior to the onset of disease symptoms. Apply before, NOT after infection has occurred.
6) Never apply Topsin more than once and always tank mix with a contact fungicide such as EBDC and TPTH.
7) To prevent fungicide resistance, if Quadris is sprayed for Rhizoctonia at the 4 leaf stage, apply a Triazole fungicide as first leafspot spray; if Proline is applied at a 4 leaf stage apply a strobilurin for the first leaf spot application.
8) Fields to be harvested after October 15th, continue Cercospora spray application until approximately September 15th - 21st for susceptible varieties.
9) Never apply fungicides closer than labeled pre-harvest interval.
10) Always scout fields in conjunction with BEETcast™ Spray Model.

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