



are some possible answers to this question.

- Increased use of susceptible varieties.
- Failing to rotate modes of action.
- Stretching spray intervals.
- Spraying other field crops (e.g. corn, soybeans, wheat, dry beans, etc) with Headline and Gem (strobilurin), and not rotating the mode of action.
- First leafspot application late.
- Poor spray techniques.
- Not tank mixing with other modes of action.
- Earlier planting dates.
- Not controlling leafspot to the end of the season.

### Types of Fungicide Resistance

There are two general types of fungicide resistance: quantitative and qualitative. With quantitative resistance, resistant fungus strains develop slowly and initially an increased dose or shorter spray intervals will compensate for the decreased fungicide efficacy. Triazoles (e.g. Inspire, Eminent, Proline and Enable) develop resistance in this way. Full blown resistance with triazoles develops over a long period of time.

With qualitative resistance the resistant fungus strains develop very rapidly and an increased dose or shorter spray intervals will not compensate for the decreased fungicide efficacy. When a fungicide develops qualitative resistance, the effect of spraying that fungicide to control leafspot is the same as if spraying with water. Strobilurins (e.g. Headline and Gem) develop resistance in this manner.

When different fungicides have the same mode of action the fungus does not distinguish between the fungicides. This is called cross-resistance. For example, if a fungus is resistant to Headline it will also be resistant to Gem because they have the same mode of action.

### Management for Cercospora Leafspot Resistance

**Cultural Practices:** Since the Cercospora fungus overwinters on infected beet leaves and on some weeds species, crop rotation is an important strategy in resistance management. A three-year to four-year rotation is recommended for reducing carryover of the fungus. Since spores can be blown several hundred feet, it is important to check with surrounding growers and see if they had poor performance with Headline or Gem (strobilurin) the previous years. Under the right conditions, spores will germinate from last years sugarbeet fields and infect adjacent sugarbeet fields.

The spores breakdown more rapidly if buried, but can survive 10 months or more if buried 8 inches or less. Burying sugarbeet litter by tillage helps reduce

inoculum survival and dispersal. Fall tillage is most effective for reducing Cercospora populations but may increase the severity of soil erosion.

**Varieties:** There are large differences in varietal susceptibility to Cercospora leafspot (Table 1). The disease develops slowly on tolerant varieties and normal control measures will effectively control Cercospora. However, leafspot is difficult to control with highly susceptible varieties and an aggressive spray program is required to protect the crop.

**Table 1: Cercospora Varieties Susceptibility**

	Tolerant Varieties	Moderately Tolerant Varieties	Highly Susceptible Varieties
Best ↑ ↓ Worst	HM 133RR	B 10RR34	B 19RR1N
	HM 131RR	SX 1291RR	B 18RR4N
	HM 173RR	HM 27RR	C RR827
	SX 1281RR	HM 28RR	C RR824
	C RR086	SX 1260RR	B 17RR32
		BTS 19RR90	
		C RR059	
		C RR074NT	

**Fungicides:** Currently, there are two general types of registered fungicides: protectant fungicides and systemic fungicides.

**Protectant Fungicides:** Protectant fungicides such as Super Tin, EBDC's (e.g. Dithane, Manzate, Penncozeb) and copper products kill fungus on the leaf surface and do not penetrate the leaves. These fungicides generally have broad spectrum disease control and have several modes of action so that they do not develop resistance easily. Protectant type fungicides do not provide long residual control and are susceptible to being washed off the leaves by rain.

Protectant fungicides should be tank-mixed with fungicides with higher risks for resistance development. Used in this manner they will help slow fungicide resistance development.

**Systemic Fungicides:** Systemic fungicides (Headline, Gem, Enable, Proline, Eminent and Enable) are absorbed by sugarbeet leaves and are rain fast when dry. Systemic fungicides are active against Cercospora for a longer period of time compared to protectants. Systemic fungicides are highly susceptible to the development of resistance and should always be tank-mixed with a protectant fungicide. The main value of protectant fungicides in our situation is for resistance management as tank-mix and rotation partners with the triazole and strobilurin fungicides.

All of the fungicides that we use in sugarbeets should be applied preventatively because they do not cure an established Cercospora infection.

Unlike protectant fungicides, penetrant fungicides

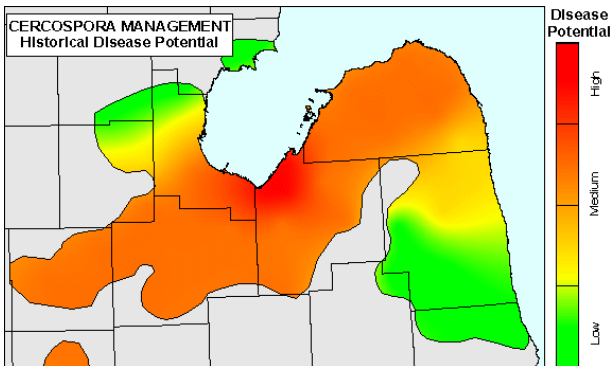
are rain fast within a few hours of application and may require less thorough application coverage to be effective. Both protectant and penetrant fungicides provide good disease control when applied before infection and are best applied on a preventive schedule.

Fungicide resistance in sugarbeets can be managed but growers will need to follow resistance management practices:

- Plant susceptible varieties only if you are willing to follow an aggressive spray recommendation.
- Use of more tolerant varieties is especially important when planting next to a field that had Cercospora problems the previous year.
- Tank mix triazoles (e.g. Inspire, Eminent, Proline and Enable), strobilurins(e.g. Headline and Gem) and Topsin fungicides with an EBDC, Super Tin, or Copper.
- Never spray with the same modes of action back-to-back.
- Use Headline and Gem (strobilurins) and Topsin only once per season.
- Use the highest labeled rates of all fungicides even in tank mixes.
- Apply fungicides in an approach to insure maximum coverage. Enhanced coverage results in improved Cercospora leafspot control.
- Use 20-25 gallons of water with 90 PSI or greater. Higher pressure and gallonage will produce the best control.
  - ◆ Minimum of 80 PSI and 20 gallons of water would be acceptable.
- Use surfactants and additives as required by product labels.
- Do not delay your first leafspot application. Follow BEETcast (Table 2) or if scouting, don't apply later than the first leafspot in your area.
- When using Headline and Gem (strobilurin) fungicides in other crops (e.g. corn, soybeans, wheat, dry beans, etc.), always tank-mix with a fungicide with a different mode of action or use available combination products.
- Longer crop rotation plays a key component in reducing Cercospora leafspot levels.
- Table 3 signifies a spray schedule in managing Cercospora leafspot.

**Table 2: Initial Spray/Subsequent Sprays**

	High	Medium	Low
<b>Tolerant</b>	55/55/55/55	60/55/55/55	75/55/55
<b>Moderately Tolerant</b>	55/50/50/50	55/55/55/55	70/55/55
<b>Highly Susceptible</b>	50/35/35/35	55/50/50/50	65/55/55



**Table 3: Spray Schedule**

If Headline or Gem Performed Well in 2011	If Headline or Gem Failed in 2011
Triazole tank-mix with an EBDC or Copper Super Tin tank-mix with Topsin or EBDC or Copper Headline or Gem tank-mix with an EBDC Triazole tank-mix with an EBDC or Copper Super Tin tank-mix with an EBDC or Copper	Triazole tank-mix with an EBDC or Copper Super Tin tank-mix with an EBDC or Copper Topsin tank-mix with an EBDC Triazole tank-mix with an EBDC or Copper Super Tin tank-mix with an EBDC or Copper

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### Summary

Growers are doing very well with high sugar prices, high yielding and high quality varieties, disease tolerant varieties and Roundup for weed control. However, we are losing Headline and Gem for Cercospora control and will also lose Eminent, Proline, Enable and Inspire if we do not employ proper resistance management strategies. Cercospora causes losses of five or more tons per acre. At the current sugar pricing, it is safe to say 5 lbs less RWST equates to \$2 lower in payment per ton delivered. Ex. 4.5 million tons in 2012 would equal out to a loss for Michigan Sugar of \$9 million with 5lbs less RWST. This should be a wakeup call for all of us.

We need to protect our sugarbeet crop from Cercospora leafspot, and thus preserve the fungicides that we have left since there are no new fungicides coming out on the market. This is why tank-mixing and following the management program for Cercospora leafspot is an important strategy in prolonging our fungicides for Cercospora leafspot control for years to come.

**For more information contact your local Michigan  
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