



American Crystal Sugar Company

AgNotes



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American Crystal 2023 Cercospora Control Recommendations

Timing & Tank-mixing Fungicides to Optimize Cercospora Leafspot (CLS) Control and Resistance Management.

For CLS control and resistance management, ACSC's fungicide tank-mix recommendations combine 2 different modes of action pairing a translaminar/systemic fungicide with a contact fungicide.

- Exception is when EBDC is alone in the 5 & 6 spray programs
 - There is no documented resistance to EBDC fungicides


Timing the start of your Cercospora Leaf Spot Spray program.

- It can take 5 to 21 days for spots to appear after Cercospora infects the leaf.
- In 2022, American Crystal worked with Dr. Wyatt, Cercospora Epidemiologist at the Fargo USDA, to analyze sugarbeet leaf samples for the presence of Cercospora DNA in leaves that had no visual Cercospora spots.
 - Each of American Crystal's Agriculturists (24) took 7 sugarbeet leaf samples weekly (168 total/week) from June 13th – July 11th.
 - **By July 7th, 100% of the locations monitored, North to South, were positive for the presence of CLS DNA in the leaf with no visual spots present.**
 - **This is even considering that 2022 was a late planted year & had a dry environment.**

What does this mean for timing Cercospora fungicide applications?


- Start early and stay on track.
 - Fungicides are protectants and are not curatives, use them as such.
 - Limit CLS infections and year-end disease severity with proactive fungicide applications to protect the sugarbeet leaves before infections can occur.
- Factors contributing to a conducive environment for CLS development:
 - Moderate to severe Daily Infection Value's (DIV's).
 - Sugarbeet leaves 4" from closing the row.
 - Free moisture on leaves (rain/dew).
- Be prepared to start as early as the end of June to the 1st week of July.
 - ACSC data shows in general that recoverable sugar/acre and revenue/acre are optimized when starting fungicide applications in this time frame.
- Initial fungicide timing for both CR+ and non-CR+ varieties are the same.
 - In CR+ varieties, the timing of the 1st two fungicide applications is most important to achieve optimum crop potential.

Work with your Agriculturist for proper timing based on environmental conditions and crop development.



<https://www.crystalsugar.com/agronomy/ag-gold-standards/>

- Fertility
- Variety Selection
- Stand Establishment
- Weed Control
- Disease & Insect Control
- Harvest

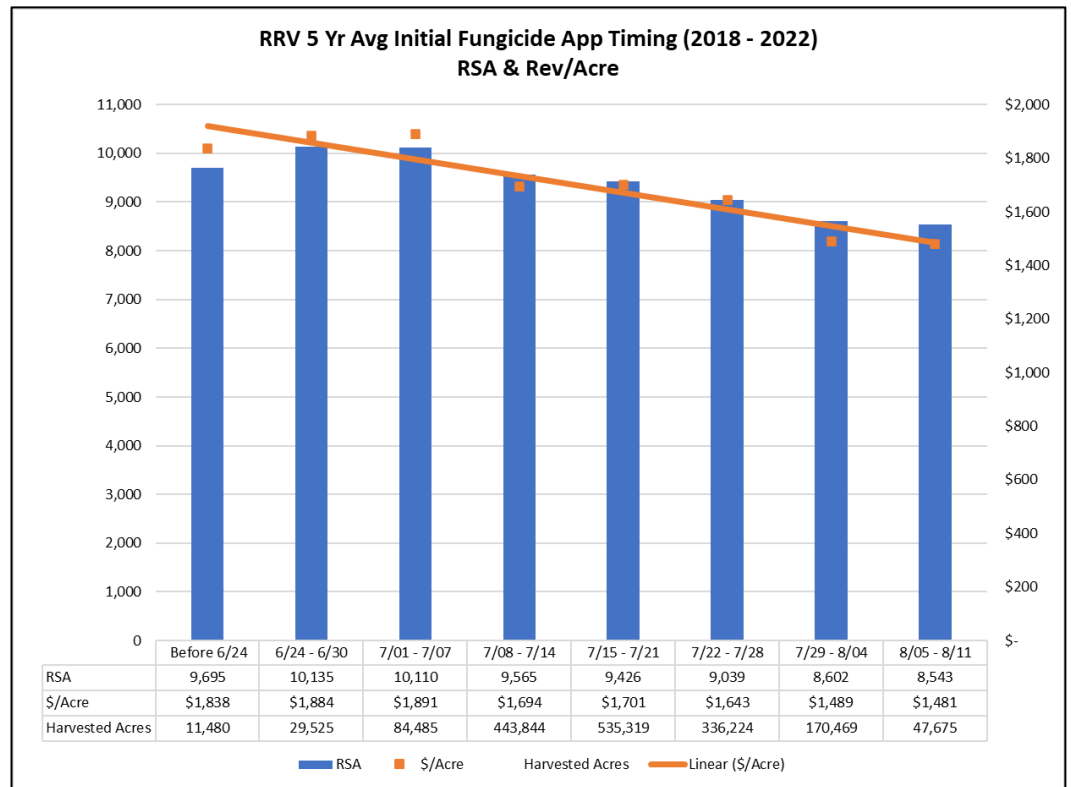
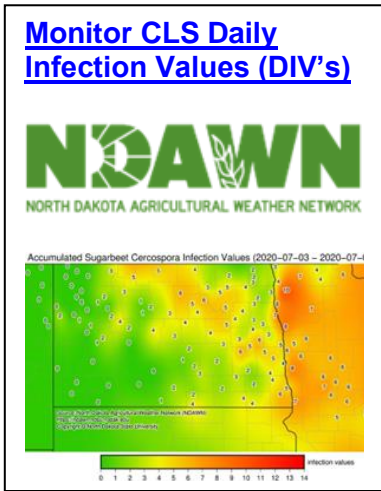


RRV Initial CLS Fungicide Application and # of CLS Fungicide Applications

The below charts are compiled from data collected by American Crystal Agriculturists from growers on their Cercospora fungicide application programs from 2018 – 2022 for the Red River Valley.

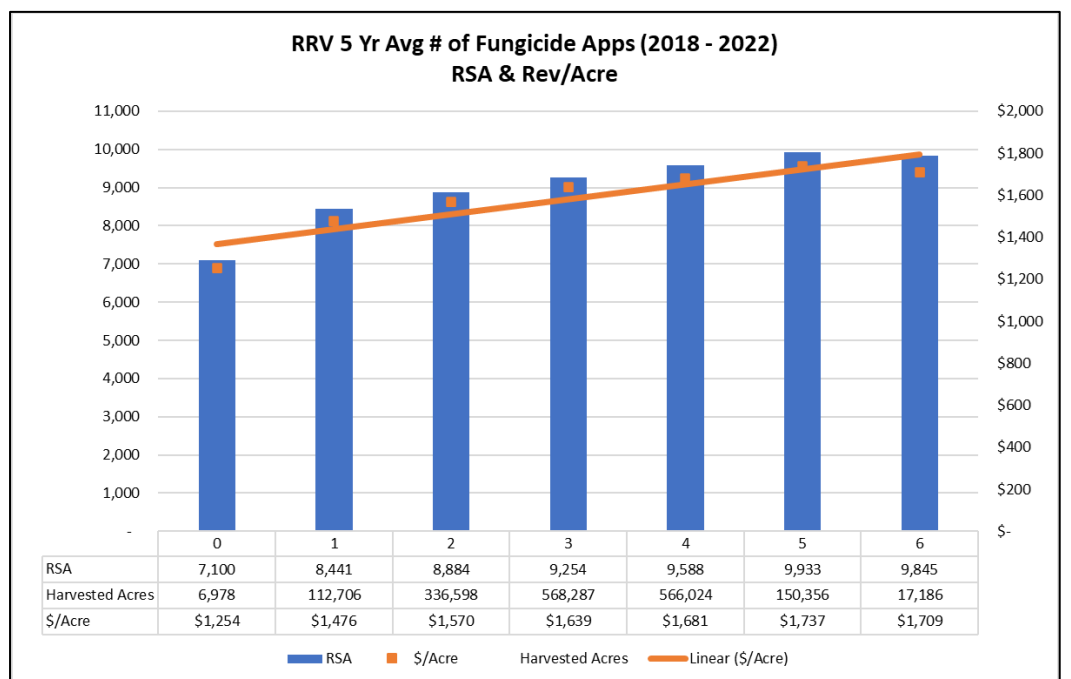
- Your Agriculturist has these same charts for their factory district and their growing area.
- The trends are the same for these as compared to the Red River Valley.

The charts below show increases in recoverable sugar/acre and revenue/acre with earlier initial fungicide applications and with additional fungicide applications.



For prompt answers to your questions and comments, call and leave a message and Tom Astrup or one of his staff will respond as soon as possible.

**Shareholders:
1-800-633-8941**



2023 ACSC Cercospora Leaf Spot Fungicide Program

<u>Application #</u> Sequence based on Initial Fungicide Application Timing & 12-Day Intervals	Late June Initial Application	Early - Mid July Initial Application	Mid - Late July Initial Application	Late July Initial Application	
				Option 1	Option 2
1	Triazole + EBDC	Triazole + EBDC	Triazole + EBDC	Triazole + EBDC	TPTH + Benzimidazole
2	EBDC	TPTH + Benzimidazole	TPTH + Benzimidazole	TPTH + Benzimidazole	Triazole + EBDC
3	TPTH + Benzimidazole	Triazole + EBDC	Triazole + EBDC	Triazole + Headline/Priaxor	Headline/Priaxor + TPTH
4	Triazole + EBDC	EBDC	Headline/Priaxor + TPTH		
5	EBDC	Headline/Priaxor + TPTH			
6	Headline/Priaxor + TPTH				

CR+ Variety CLS Fungicide Program

	Late June Initial Application	Early - Mid July Initial Application	Mid - Late July Initial Application	Late July Initial Application
1	Triazole + EBDC	Triazole + EBDC	Triazole + EBDC	Triazole + EBDC
2	TPTH + Benzimidazole	TPTH + Benzimidazole	TPTH + Benzimidazole	Extended Interval
3	Extended Interval	Extended Interval	Extended Interval	Headline/Priaxor + TPTH
4	Triazole + EBDC	Triazole + EBDC or EBDC	Triazole + Headline/Priaxor	
5	Extended Interval	Headline/Priaxor + TPTH		
6	Headline/Priaxor + TPTH			



Contact your Agriculturist

Contact your American Crystal Agriculturist for the most up-to-date information and issues affecting sugarbeets in your area.

ACSC Cercospora Recommendations are formulated based on both: Cercospora leaf spot (CLS) control and fungicide resistance management

- Tank-mix and rotate different fungicide chemistries
- ACSC tank-mix recs combine both systemic/translaminar + contact fungicides
- 12-day spray intervals
- **Fungicides are protectants**, they are not curatives.
- **Initial fungicide application timing** is critical, prior to or at row closure, to prevent Cercospora establishment in fields. Better to apply too early than too late
- **Last App** – Designed to be applied last week of August to 1st week of September
 - Fungicide application may still be needed in September
 - Discuss with Agriculturist options w/PHI's for Prepile & Stockpile

CR+ Varieties

- The timing of the 1st two applications are most important to achieve maximum potential
- **Initial fungicide applications** should have the same timing for both CR+ & non-CR+ varieties
- Extended Intervals are NOT Skips
- Continue to monitor Daily Infection Values & CLS
- CR+ does Not have immunity to Cercospora leaf spot, only a higher tolerance.
- CR+ varieties require fungicide applications to optimize control, Recoverable Sugar/Acre & Revenue/Acre



Triazoles

- Do not use in more than 50% of applications per cropping season and only in a tank-mix.
- Triazoles are vital to CLS management and overuse may further increase resistance.
- Alternate different Triazoles if used more than once in a spray season.
- Due to a high probability of cross-resistant CLS spores
 - Only one product from the below groups should be used in a season.
 - Do not use both Provysol & Inspire XT in the same growing season.
 - Do not use both Proline & Minerva/Domark in the same growing season
- Watch Preharvest intervals (PHI's) for Triazoles, they can range from 7 to 14 to 21 days.
 - Consider applying Triazoles with longer PHI's early in the spray season
 - Use shorter PHI's later in your fungicide program for harvest planning.

EBDC's (Mancozeb/Manzate):

- Are an effective tank mix partner for CLS control and resistance management.
- There is no known resistance to EBDC's.
- Pre-Slurring product helps in tank-mixing.
- Manebs are not as effective on CLS as Mancozeb's.

Tins (TPTH):

- Use in only **2** applications per cropping season and only in a tank-mix.
- Tins are vital to CLS management and overuse may further increase resistance.

Topsin (Benzimidazole):

- Use only **once** per season early in spray program & only in a tank-mix (e.g., Tins - TPTH).

Headline/Priaxor/Veltyma (Strobilurin):

- Headline/Priaxor benefits include: plant health; harvest frost deterrence/recovery; and storage benefits.
- Use with a tank mix of Tin (TPTH) or a Triazole at a full rate.

Copper

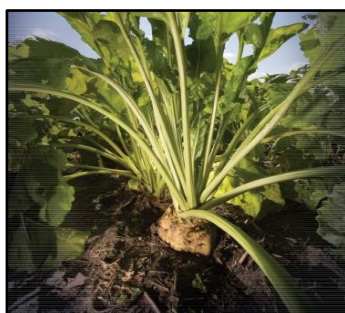
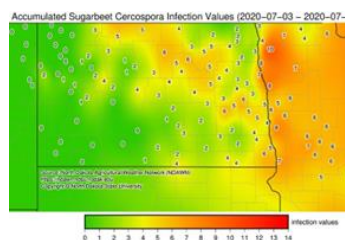
- Coppers have a 0-day Pre-Harvest Interval (PHI), option if up against Pre-Harvest Intervals during pre-pile or before stockpile harvest as a tank-mix partner.
- Ideally tank-mix copper with a non-contact fungicide (Triazole) to avoid two contact fungicides in the same application. Must adhere to the PHI of tank mix partner.
- Talk to your Agriculturist if you are planning to use a Copper product

Fungicide Use Information				
Fungicide Class	Fungicide	Rate/Acre	REI (Reentry Interval) Hours	PHI - (Pre-Harvest Interval) Days
Triazole	Inspire XT	7.0 oz.	12	21
Triazole	Proline	5.7 oz.	12	7
Triazole	Provysol	4 oz.	12	7
Triazole	Minerva / Eminent VP	13 oz.	12	14
Triazole	Domark	6.9 oz.	12	14
Triazole + TPTH	Minerva Duo	16 oz.	48	14
Triazole + SDHI	Lucento	5.5 oz.	12	21
Triazole + Strobilurin	Veltyma	8.0 oz.	12	7
EBDC	Several	Ranges by Product	24	14
TPTH (liquid)	Agri Tin Flowable / Super Tin 4L	8.0 oz.	48	7 MN / 7 ND
Benzimidazole (liquid)	Topsin 4.5FL / T-Methyl 4.5F	10.0 oz.	24	21
Benzimidazole (dry)	Topsin M 70W / T-Methyl 70WSB	0.5 lbs.	24	21
Strobilurin	Headline SC	9.0 oz.	12	7
Strobilurin + Xemium	Priaxor	6.7 oz.	12	7
Copper	Several	Ranges by Product	48	0

This table is not a substitute for the product label. Always refer to the label for product details.

Tips for Maximizing Cercospora Leafspot Control

Monitor CLS Daily Infection Values (DIV's)



CONTACT YOUR AGRICULTURIST

Contact your American Crystal Agriculturist for the most up-to-date information on issues affecting sugarbeets in your area.

1. **CLS variety rating** – CLS control should improve with a better CLS variety rating. However, this may not equate to fewer fungicide applications. [Variety Selector CLS Ratings](#)
2. **Daily Infection Values** – Monitor Daily Infection Values (DIV's) and weather forecasts for timing initial and following fungicide applications @ [NDAWN](#)
3. **Timing of fungicide program** – Start program once rows are 4" from closing and coinciding with Moderate to Severe DIV's. Start early and stay on track. Cercospora Leaf Spot can appear 5 to 21 days after spore infection. Fungicides are protectants, being proactive by applying fungicides ahead of infection limits the development of Cercospora leaf spot.
4. **Full rates** – In tank mixes utilize full application rates of each tank mix partner, following label recommendations.
5. **Spray intervals** – The time interval between applications should not exceed 12 days, plan best as possible around adverse weather conditions (rain, wind, hail). For EBDC's alone follow a 7-day spray interval.
6. **Aerial application** – If too wet for ground application, stay on schedule with an aerial application.
7. **Glyphosate tank mixes** – Are not recommend with CLS fungicide applications since optimum water volume requirements are different for glyphosate and CLS fungicide applications as the target pests are not the same.
8. **Pre-Pile & Fungicide Pre-Harvest Intervals** – Be aware of each fungicide's Pre-harvest Interval and how that may impact pre-pile harvest plans. Adjust your fungicide spray program accordingly.
9. **Water volume** – CLS fungicides need excellent coverage to protect the sugarbeet leaf surface. To achieve this requires a minimum of 15 to 20 gallons of water per acre. More water is better!
10. **Pressure** – High pressure applications at 80+ psi provides improved leaf coverage depending on the spray tip chosen.
11. **Spray nozzles/tips & droplet size**– Using nozzles that will produce Medium droplet sizes of 250–350µm (microns) is optimum for fungicide applications. Utilize nozzle manufacturer's recommended application pressure to operate within this range. Use proper spray boom height above crop canopy depending on chosen spray nozzle degree angle for best coverage.

Wales tank mixing order for Pesticides

1. **Wettable powders & dispersible granules**
2. **Agitate tank to mix thoroughly**
3. **Liquid flowables & suspensions**
4. **Emulsifiable concentrate formulations**
5. **Surfactants & Solutions**

12. **Tank mixes** – All fungicide applications should contain more than one chemistry or mode of action (MOA). Only exception would be EBDC's. Tank-mixing fungicide MOA's and rotating MOA's are paramount. Using only a single fungicide, MOA, increases resistance development pressure to that fungicide. Single fungicide applications may "get you by" but will increase and compound resistance to fungicides on your farm and surrounding neighbors. Utilizing all available fungicide chemistry wisely is vitally important for current fungicide options today and tomorrow. Any tank mix should be sprayed out as soon as possible, with agitation, do not allow mix to sit overnight, spray tank out completely, and rinse sprayer (all lines and tank) with clean water daily.

13. **Water temperature** – Warm water is best for dissolving & mixing fungicides. Pre-warm water in dark bulk tanks a few days prior to use, sunlight aids in warming the water.
14. **Jar test** – If in doubt about a tank mix, run a jar test to see if combination is compatible before loading sprayer.
15. **Scout fields** –during the growing season to evaluate how your fungicide spray program is working.