

AGNOTES

From the desk of **Joe Hastings, General Agronomist - Editor**

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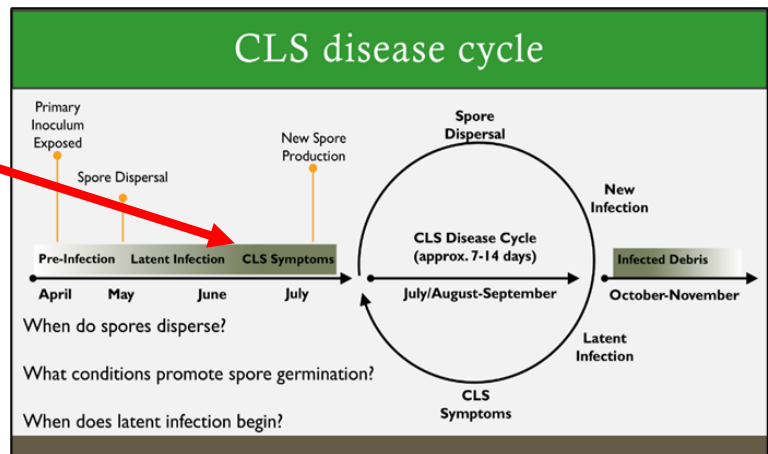
Cercospora Leaf Spot (CLS) Epidemiology

Dr. Wyatt, Dr. Bolton, Dr. Secor, and Viviana Rivera-Vara's work at Fargo USDA & NDSU has shown ground-breaking advancements in understanding Cercospora Leaf Spot (CLS) epidemiology. The last 5 years of CLS research has brought more understanding than ever before. Leaf samples from throughout the RRV have been supplied by American Crystal Ag Staff over the years to assist in this research. This research has identified: CLS spore dispersal timing from previous year's beet fields; CLS presence in leaves prior to visual detection; dynamic in-season Cercospora resistant population shifts in response to the fungicide modes of action applied. Also, it has been found that resistance for a location is not absolute in that there are surprisingly high levels of susceptible isolates within a sampled population. Therefore, efficacy and CLS control can be maintained by tank mixing and rotating fungicide modes of action (MOA's) as well as starting early to treat primary CLS infection and delay CLS on-set in the field.

The slides contained in this Ag Notes issue were created by and are credited to Dr. Wyatt, Fargo USDA Epidemiologist.

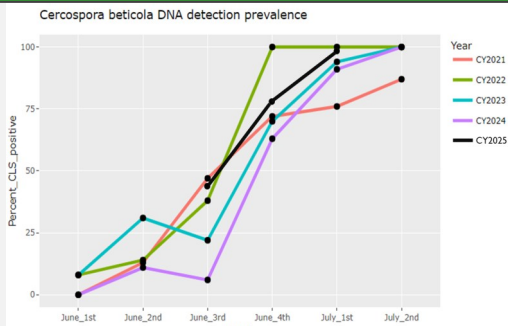
[Cercospora Resources Link](#)

It is critical to time the initial CLS fungicide application during the Latent Infection time period, late June — 1st week of July before CLS spots are visible, to protect the sugarbeet leaf canopy from CLS infection. This limits the amount of inoculum subsequently produced from within the current year's beet field to reduce infection pressure & severity.



2021-2025 Latent CLS prevalence

Latent infection consistently occurs at or just prior to row closure in the RRV by late June to the 1st week of July



Wyatt et al. Unpublished data

Latent CLS Infection = Initial Infection Prior to Visual Spots

Dr. Wyatt's research shows virtually all locations are positive for the presence of CLS by the first week of July every year. This coincides when the sugarbeet is at or near canopy closure.

The initial CLS fungicide application timing is the most critical component to get correct in the Cercospora fungicide program for control and to optimize revenue potential. Starting too late puts the entire CLS fungicide program's efficacy in jeopardy as you are already "behind".



Fertility
Variety Selection
Harvest
Stand Establishment

Weed Control
Disease Control
Insect Control



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Fungicide Cross-Resistance

The lower the cross-resistance factor, the greater the probability that if one fungicide mode of action won't control *Cercospora*, the other will. This is why we tank mix. When comparing Headline to Headline you have a fungicide cross resistance factor of "1.00" as you are comparing the likelihood of probability of cross resistance to itself. When looking at the cross-resistance factor of Tin to Topsisin it is very low at 0.21, making this an excellent tank-mix combination. Another pairing to highlight is Headline to Tin with a cross resistance of 0.40. This shows why these tank-mix partners have performed very well together. There has not been any documented resistance to EBDC's, 0.00 cross resistance across the board, making them an ideal tank-mix partner with the Triazole (DMI) modes of action (Inspire XT, Proline, Minerva/Domark/Eminent, Provysol). **Tank-mixing and rotating these modes of action provides strength to the fungicide program limiting escapes in control & lowers resistance levels across modes of action.**

Fungicide cross resistance								Primary results
Fungicide	Commercial product	Headline	Topsin	Domark	Proline	Inspire	TPTH	
Strobilurin	Headline	1.00						<ul style="list-style-type: none"> Cross resistance is relatively low between different chemistries Tank Mixing multiple chemistries as an effective strategy No EBDC resistance has been detected. <p>Cross resistance scored from 0.00 to 1.00 with higher values indicating higher degrees of cross resistance.</p>
Benzimidazole	Topsin	0.18	1.00					
Triazole	Domark	0.69	0.33	1.00				
Traizole	Proline	0.53	0.41	0.92	1.00			
Triazole	Inspire	0.51	0.37	0.59	0.60	1.00		
Tin	TPTH	0.40	0.21	0.48	0.54	0.43	1.00	
EBDC	EBDC	0.00	0.00	0.00	0.00	0.00	0.00	
EBDC	EBDC	0.00	0.00	0.00	0.00	0.00	0.00	

C. beticola population dynamics

Fungicide	Commercial name	Mutation	2016	2017	2021	2023	2024
Strobilurin	Headline	G143A	29%	31%	20%	25%	33%
Triazole	Domark/Proline	E170	81%	46%	72%	62%	75%
Triazole	Inspire/Provysol	L144F	47%	45%	51%	53%	55%
Benzimidazole	Topsin	E198A	30%	14%	23%	15%	29%
Organotin	SuperTin	GST	31%	22%	35%	30%	30%

Frequency of fungicide resistance mutations in whole genome sequenced *C. beticola* isolates collected at the end of season survey.

Though the incidence of fungicide resistance is high across fields for any level of resistance, the individuals in those fields show lower resistance levels.

Example: Most fields sampled in 2021 had isolates that were Tin resistant. BUT not all of the isolates in any one field were resistant.

% Resistance Population vs. % of Locations with Resistance

The traditional end-of-season sugarbeet leaf samples used over the last few decades have shown that there have been increases in the % of field locations that contain fungicide resistance across all modes of action. This was measured in a way that if there was 1 out of 100 isolates from a location sample that were positive for resistance, that location was marked as entirely positive for resistance to that fungicide to the degree of resistance expressed. This interpretation is what was shown in the resistance maps that were developed in previous years. Because of new genetic evaluation technology, isolates can be studied on an individual basis (quantitatively) and not as a whole general population for a location (qualitatively).

It can now be shown that, even though many sample locations have isolates with fungicide resistance, the CLS isolate population demographic in those fields actually have a higher percentage of susceptibility to all fungicide modes of action than what could have previously been detected. In 2024 samples: only 33% of the *Cercospora* isolates were resistant to the strobilurin Headline; 29% for Topsin; 30% for Tin; 55% for Inspire/Provysol; and 75% for Proline/Minerva/Domark/Eminent. There has not been any EBDC resistance found. This new information is groundbreaking in restoring confidence in using and tank-mixing all of our available fungicide modes of action for *Cercospora* control and continued resistance management.

General Comments: It is extremely important to have a well-timed initial fungicide application, prior to or at row closure, to keep *Cercospora* from becoming established in fields. Diligent CLS management by tank-mixing and rotating fungicide modes of action is highly recommended to aid in reducing overall CLS infections and inoculum. Use 15-20 gallons per acre water at 80+ psi, starting spray program earlier and 12-day maximum spray intervals.

Monitor CLS Daily Infection Values (DIVs)

NDAWN
NORTH DAKOTA AGRICULTURAL WEATHER NETWORK

Contact Your Agriculturist

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