

Investigation of cover crops for *Cercospora* leaf spot control in sugarbeet, 2024-25

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Investigating the interactions between various cover crops and *C. beticola* could inform the potential use of these practices in CLS management. This study aims to determine the impact of common cover crops on *C. beticola* growth and CLS on sugarbeet in Michigan. This research will provide valuable insights for sustainable management strategies for CLS on sugarbeet.

Methods: In 2021-22, 2023-24, and 2024-25, fall-planted cover crop treatments were tested in field trials at the Saginaw Valley Research and Extension Center (SVREC). Treatments were replicated four times in 10 ft by 60 ft (3 m by 18 m) plots using a randomized complete block design with 10 ft wheat buffers. Cover crop treatments, including rye, radish, and a combination of oat and clover, were planted after sugarbeet harvest with the aim to decrease *C. beticola* inoculum survival. The seeding rates for Wheeler rye (Moore Seed Farm, Elsie, MI), Defender oilseed radish (P. H. PETERSEN, Lundsgaard, Schleswig-Holstein, Germany), common oats (Johnny's Selected Seeds, Winslow, ME), and Crimson clover (Johnny's Selected Seeds, Winslow, ME) were 100, 35, 8, and 9 pounds per acre, respectively. In 2024, cover crops were planted Oct 3. In the spring of 2025, highly CLS-susceptible sentinel beets were placed biweekly into the plots to measure CLS pressure from May to July. One week of data was collected before the termination of the cover crops, and subsequent sampling took place after chemical termination using Roundup (Bayer, Leverkusen, Germany). While results are not discussed here, fall and spring biomass, stand counts, and soil sample analyses were obtained from cover crop treatments in both the 2023-24 and 2024-25 studies. In 2025, susceptible sugarbeet variety HIL-2332NT was planted after cover crop termination, and wheat buffers were left standing for the duration of the season. CLS severity ratings (0-10) were collected from ten mid-canopy leaves of ten different plants located in the center two rows of each plot on Aug 6, Aug 26, and Sep 5. A CLS severity index (DX, %) was calculated by multiplying the incidence (%) by the average severity of symptomatic leaves (%) divided by 10. Final in-field area under the disease progress curve (AUDPC) was calculated across these dates.

Results: In 2021-22 no significant differences in leaf degradation, *C. beticola* sporulation or viability, sentinel beet lesions, yield, percent sugar, RWSH, and RWS were observed for the Wheeler rye (or factory lime) treatments compared to the non-treated control ($P > 0.05$). However, the Wheeler rye cover crop significantly reduced AUDPC the following season compared to the non-treated control ($P < 0.0001$; data not shown). While some numerical trends were evident, no significant difference between the CLS lesions on sentinel beets was observed in the 2023-24 (data not shown) or the 2024-25 studies ($P > 0.05$, Figure 1).

However, CLS severities ($P < 0.01$) and AUDPC ($P < 0.001$), measured from HIL-2332NT sugarbeets planted after cover crop termination, were significantly reduced following fall-planted rye (Figure 2). Of note, the oats and clover treatment resulted in significantly greater in-field AUDPC than the non-treated control. These results support our previous laboratory observations and field experiments indicating fall-planted rye cover crops have potential to suppress CLS inoculum significantly reducing CLS severities in sugarbeet planted the following year. Further investigation of these and other cover crop options may be of interest in future studies.

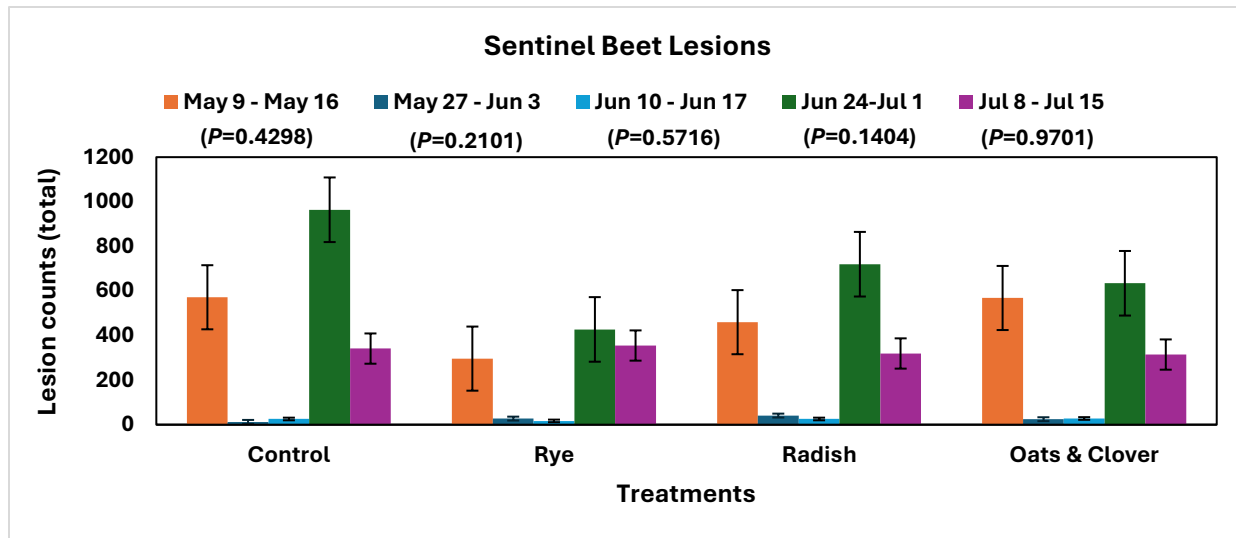


Figure 1. From 2024-25 field studies, average CLS lesion counts on highly susceptible sentinel beets (F1042) exposed for one week in field plots then incubated in a humidity chamber for 3 days and monitored at ambient conditions for 3 weeks. Cover crop treatments represent Wheeler rye, Defender oilseed radish, and common oats mixed with Crimson clover compared to a non-treated control.

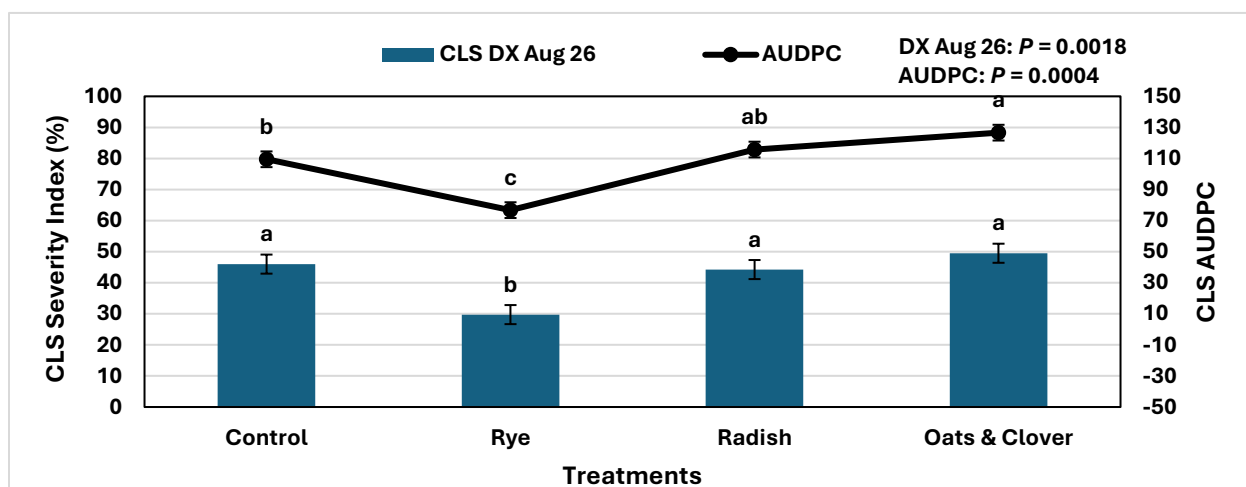


Figure 2. Cercospora leaf spot severity index (%) and area under the disease progress curve (AUDPC) calculated from CLS severities (KWS, 0-10) collected from HIL-2332NT sugarbeets planted after cover crop termination. Cover crop treatments represent Wheeler rye, Defender oilseed radish, and common oats mixed with Crimson clover compared to a non-treated control. Significant differences indicated by different letters based on Fisher's Protected LSD ($\alpha=0.05$).

Overall Summary:

- Based on laboratory assays, Crimson clover and Wheeler rye showed potentially useful inhibitory effects on *C. beticola* growth in culture (Hernandez et al., REACH 2025).
- In field studies, significant suppression of CLS development was also observed following a fall-planted rye cover crop (2021-22 and 2024-25).

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