

Optimizing *Brassica carinata* disease management to protect against yield loss due to Sclerotinia stem rot

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Introduction

- *Sclerotinia sclerotiorum* is a plant pathogen with a wide host range that causes stem rot on *Brassica carinata* (carinata).
- The impact on yield and integrated disease management strategies have not been well established for Sclerotinia stem rot (SSR) disease of carinata.

Objectives

1. Determine the optimum growth stage to apply a fungicide for managing Sclerotinia stem rot on carinata.
2. Relate SSR with carinata yield.
3. Quantify impacts of cultural management practices for SSR, including crop rotation and variety resistance.

Methods

- Four carinata varieties (whole plot) were planted at the UF/IFAS NFREC in Quincy over four seasons in the same field in a RCB split-plot design with four blocks. (2018 = 2017-18 growing season, etc.)
- The fungicide Proline (5.7 fl oz/A) was applied at different growth stages (subplot) as shown in Figure 1. [Early flowering is 10-50% buds open. Mid flowering is 55-70% buds. Full flowering is 75-100% buds open just as petals begin to drop (<10%).]
- Sclerotinia stem rot incidence and severity was assessed in two quadrants/plot (1 m x inner 3 rows with 12-in row spacing).
- Sclerotinia disease severity index (DSI) = $100 \times \frac{\sum(\text{severity rating scale from 0-5 per infected plant})}{(5 \times \text{stand count})}$.

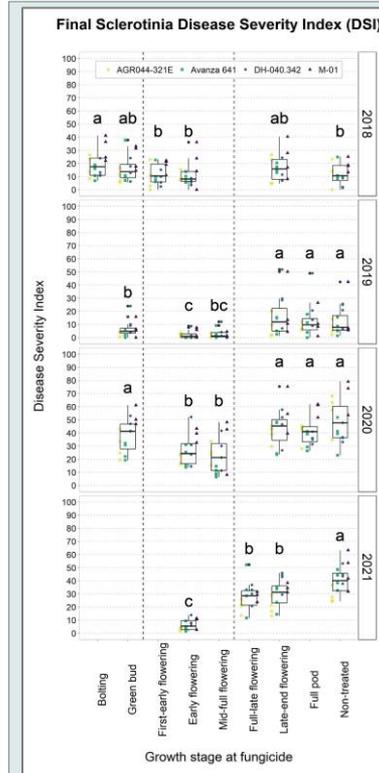


Figure 1. Comparison of final Sclerotinia stem rot disease severity index by the carinata growth stage when a fungicide was applied. Boxplots with the same letter within season are not significantly different according to Tukey's HSD ($\alpha = 0.05$).

Conclusion

Due to the impact of SSR on yield that can vary by season and cultural practices, optimal management including efficient fungicide inputs and crop rotation can contribute to the economic and environmental sustainability of *Brassica carinata*.

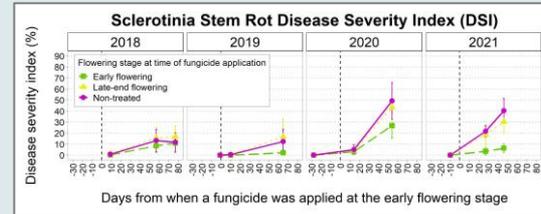


Figure 2. Change in Sclerotinia stem rot DSI by season. The dotted vertical line at $x = 0$ marks when the early flowering fungicide was applied for the respective season. Means \pm standard deviation include all four carinata varieties.

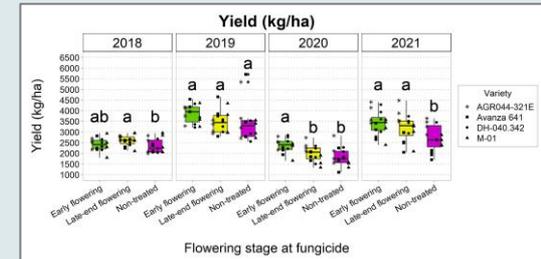


Figure 3. Comparison of yield by carinata flowering stage when a fungicide was applied. Boxplots with the same letter within season are not significantly different according to Tukey's HSD ($\alpha = 0.05$).

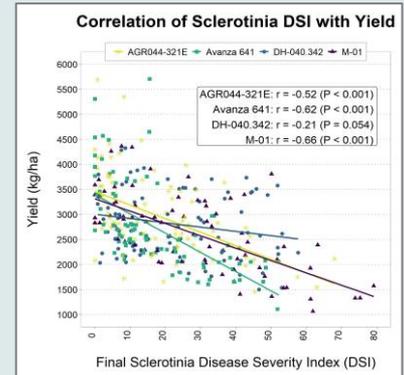


Figure 4. Pearson's correlation of final Sclerotinia stem rot disease severity index (DSI) with yield by carinata variety including all four seasons (2018 – 2021).

No interactive effect of variety by treatment for SSR DSI or yield was observed for all seasons ($P > 0.27$).

Results & Discussion

- Early to full flowering, before or just as petals begin to drop (<10%), is the optimum carinata growth period to apply a fungicide for controlling SSR, but seasonal differences and history of disease can affect the magnitude of control (Figures 1 and 2).
- Applying a fungicide at early flowering resulted in higher yield compared to the non-treated control in seasons 2020 and 2021 (Figure 3).
- The increase from a non-treated average of 12% SSR DSI in 2018 and 2019 to 49% in 2020 that remained at 40% in 2021 (Figure 2) suggests a need for rotation with a non-susceptible crop.
- There was a good correlation of yield with SSR DSI, except for variety DH-040.342 which had a low correlation with less variable yield despite a large range of stem rot infection (Figure 4).

Future Work

Develop a predictive model for Sclerotinia stem rot of *Brassica carinata* based on environmental factors and cultural practices for integrated disease management.