Carinata Sclerotinia stem rot advisory system

Ian Small – University of Florida
Kira Bowen and Austin Hagan – Auburn University

2017 Carinata Summit
Quincy, Florida
March 30th, 2017
Managing disease risk

• Sclerotinia stem rot (SSR) and pod rot are a potential threat to carinata production

• Risk will increase with:
  • Scaling of production
  • Increased frequency of carinata production


Photo credit: R. Seepaul

Life cycle of *Sclerotinia sclerotiorum*

Sclerotinia stem rot management

- Plant disease resistance should be cornerstone of management plan
  - Select for disease resistance in advanced varieties

- Rotate crops!
  - Recommended rotation interval for carinata?
  - Probably 3 years but life cycle analysis will provide insights.

- Fungicides will likely play an important role
  - Efficient and cost-effective use will be important
Efficient fungicide use

• Decision support tools (disease forecasts) can provide guidance to ensure efficient use of fungicide

• Examples of tools for canola and rape:
  • Inoculum prediction (Twengstrijm et al., 1998)
  • Weather-based disease prediction model (Koch et al., 2007)
Disease forecasting for SSR of canola

- Weather-based model
- Cropping history
- SSR history
- Date of planting
- Tillage practices
- Row spacing

- Risk prediction only valid during flowering period

[Image: Estimated risk of Sclerotinia stem rot development for canola 3/26/2017]

https://www.ag.ndsu.edu/sclerotinia/riskmap.html
Objectives:

1a. Determine the temperature range and moisture duration requirements for *S. sclerotiorum* infection of carinata and canola

1b. Validate/modify a weather-based SSR advisory model for the Southeast U.S.

2. Parameterize a weather-based model to predict carinata growth stages:
   - GS 58 (individual flower buds on the secondary inflorescences visible but still closed)
   - GS 60 (start of flowering period)

3. Implement models as web-based risk maps and decision tools
Objective 1. Sclerotinia stem rot advisory model

A. Determine environmental requirements for *S. sclerotiorum* infection on carinata and canola
   - Controlled environment and field studies

B. Validation/modification of existing advisory model (Koch et al., 2007)
   - Schedule fungicide applications based on accumulated infection hours
   - Number of hours with temperatures > 7°C and ≥ 80% relative humidity (RH) accumulated after GS 58 (late bud stage)
   - Validation of 23 ih threshold for fungicide application (winter oilseed rape)
   - Comparison with standard calendar fungicide programs - a single application at GS 62-65 [full flowering, 20 to 50% flowers open on main raceme, older petals falling]
   - Second application 14 days later?
Objective 2. Timing of late bud stage (GS 58)

- Estimation of growth stage is important for SSR risk prediction and timing of fungicide applications

- Influenced by many factors:
  - Variety, planting date, agro-ecological zone, seasonal weather

- Scouting to determine growth stage
- Parameterize a crop model
- Combine with satellite + UAV imagery
Objective 3. Implementation of risk models

1. Agroclimate
2. Carinata Decision Support System

- Planting date planner
- Freeze risk probabilities
- Flowering period predictor
- Sclerotinia stem rot risk tool
Local weather data for the Southeast U.S.
Local weather data for the Southeast U.S.
Carinata decision support system

- Location-specific weather data

- Disease forecasting tools

- Growth stage predictor

- Alert system

Credit: R. Seepaul

Small et al. 2015. Computers and electronics in agriculture

https://www.ag.ndsu.edu/sclerotinia/riskmap.html
Work in progress...