Carinata Sclerotinia stem rot advisory system

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2017 Carinata Summit
Quincy, Florida
March 30th, 2017

Managing disease risk

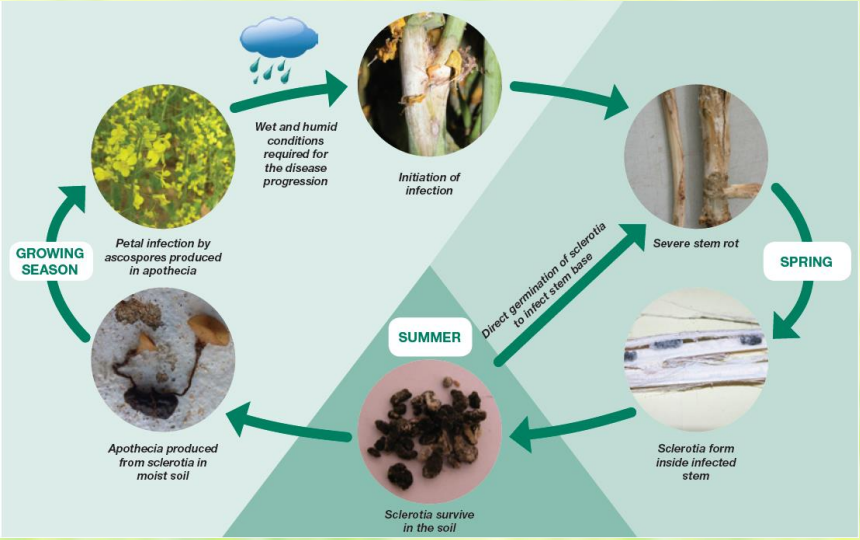
- Sclerotinia stem rot (SSR) and pod rot are a potential threat to carinata production

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

Stem rot

Pod rot

Photo credit: R. Seepaul



Life cycle of *Sclerotinia sclerotiorum*

https://www.agric.wa.gov.au/canola/managing-sclerotinia-stem-rot-canola

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

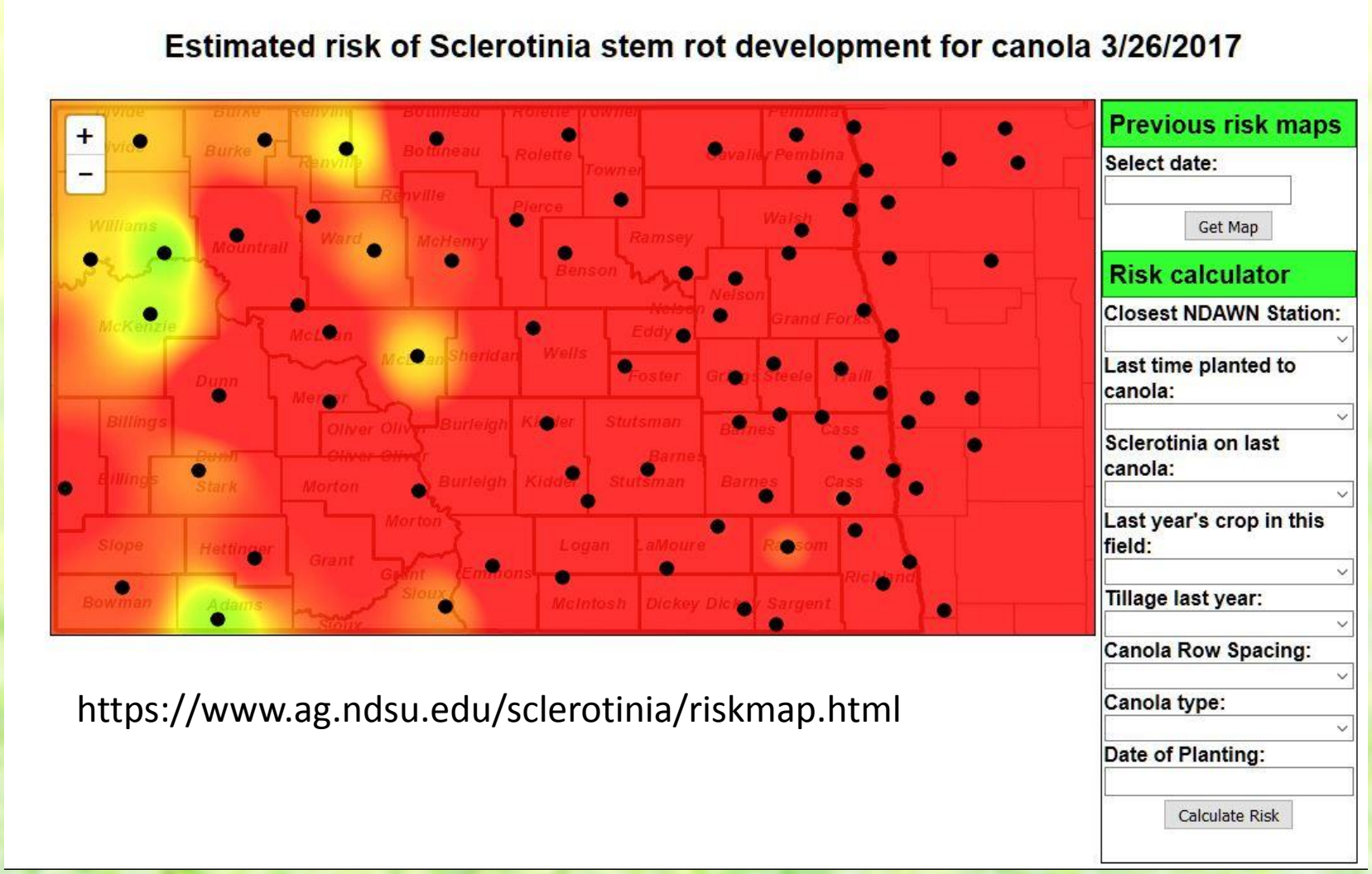
- Decision support tools (disease forecasts) can provide guidance to ensure efficient use of fungicide

- 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 <u>flowering period</u>



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

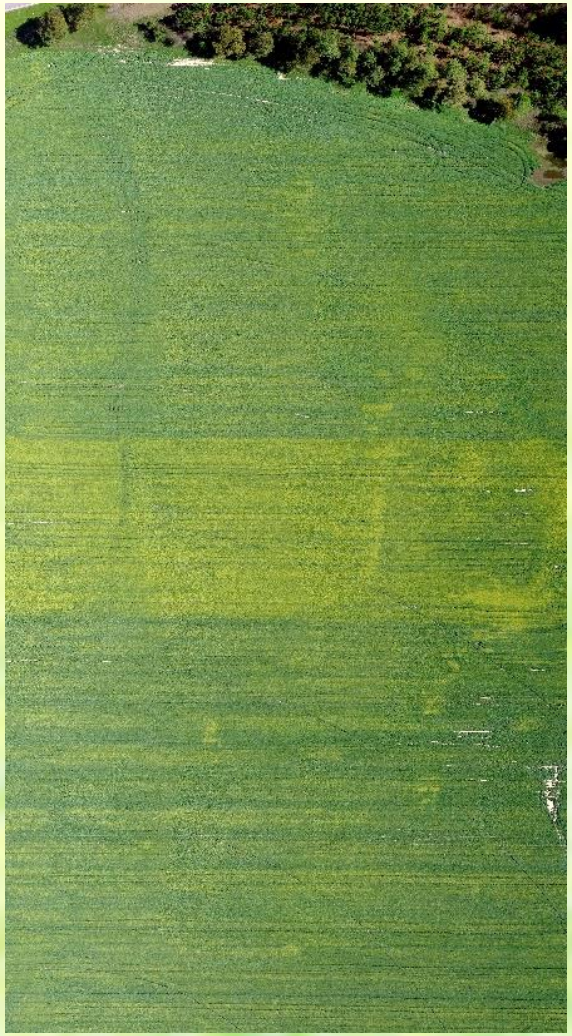
B. Validation/modification of existing advisory model (Koch et al., 2007)
   - Schedule fungicide applications based on accumulated infection hours
   - Number of hours with temperatures > 7°C and ≥ 80% relative humidity (RH) accumulated after GS 58 (late bud stage)
   - Validation of 23 ih threshold 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

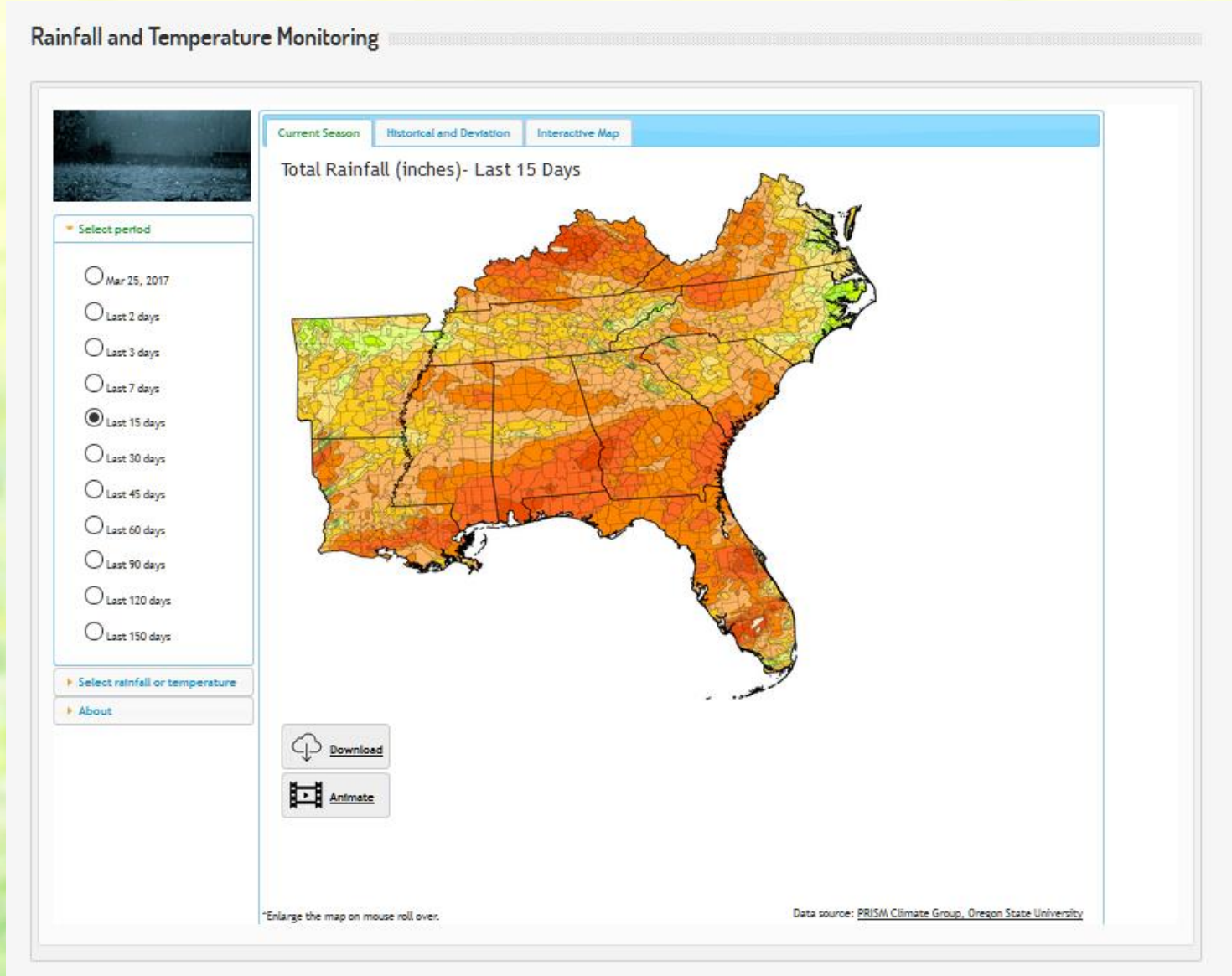
- Planting date planner
- Freeze risk probabilities
- Flowering period predictor
- Sclerotinia stem rot risk tool

Local weather data for the Southeast U.S.

Florida Automated Weather Network

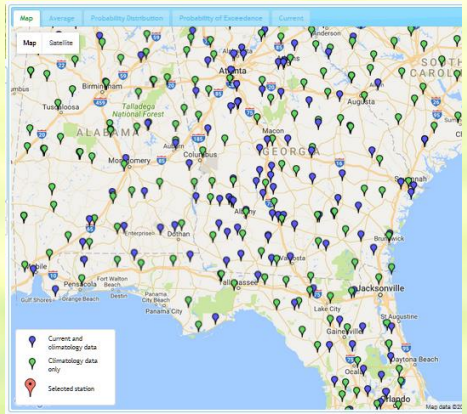
Georgia Automated Environmental Monitoring Network
www.GeorgiaWeather.net

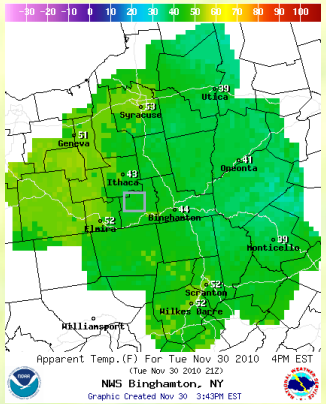
Local weather data for the Southeast U.S.



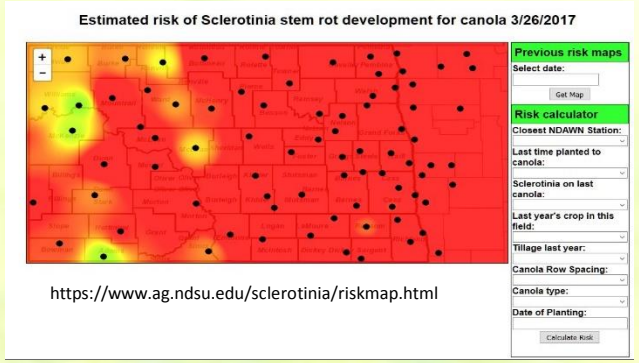
Carinata decision support system

Location-specific weather data





Disease forecasting tools



Growth stage predictor

Credit: R. Seepaul

Alert system

Small et al. 2015. Computers and electronics in agriculture

Work in progress…

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