Monitoring: Spore Trapping

Presenter
John Rupe
Projects

- Florida SBR Collection Network
  - UF, UI, USDA-ARS
  - Dry and rain deposition

- Syngenta Spore Trap Network
  - Syngenta, UA
  - Dry deposition

- Detection of SBR Spores in Rain
  - USDA-ARS, UM
  - Rain deposition
Objectives

- Determine spore distribution during the season
- Determine possible inoculum sources
- Efficacy of spore trapping in forecasting soybean rust
Florida SBR Collection Network

✓ Funded by
  ✓ USDA NRI Biosecurity grant
  ✓ USDA RMA-CSREES Interagency Agreement

✓ Spore traps
  ✓ Passive, dry deposition
  ✓ Rain deposition
Spore Traps

- Passive, dry deposition
  - Glass slide coated with petroleum jelly
- Rain deposition
  - Funnel 36 cm dia.
  - Filters-47 mm in diameter, 12 µm pore
- Changed weekly
Traps located in 18 counties and sampled from February to October

Tested by qPCR

Of the 408 samples from passive traps, 44 were positive (11%)

Of the 408 sample from rainwater traps, 17 were positive (4%)
Florida Passive Traps 2006

Month of First Detection

- March
- April
- May
- June
- July
- August
- Negative
- Not tested
Florida Rain Traps 2006

Month of First Detection

- Green: June
- Pink: July
- Red: August
- Orange: Negative
- White: Not tested
102 samples were collected throughout the state mostly in July and August and mostly on a weekly basis. These included passive (microscope slides) and active traps. 12 of the passive traps had "rust-like" spores; none of the active traps were rust positive based on PCR assays. Rust was first found 10 October 2006 - only one trap in southern Illinois was still active through September and part of October; no spores were found on passive traps during that time.
Conclusions

✓ No strong geographic or temporal pattern
✓ Did not collect spores from adjacent diseased plots
✓ September and October data being analyzed.
GIS Analysis
of the Syngenta Spore Trap Network Data
2006 Season
11-29-2006

Acknowledgements
University of Arkansas
Iowa State University
St. Louis University
State Universities & Land Grant Extension Personnel
Syngenta Pathology Staff & Technical Service Representatives
Syngenta GIS staff
USDA PIPE Web Site & ZEDX Inc.
Soybean Rust-like Spores
<table>
<thead>
<tr>
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<th>2005</th>
<th>2006</th>
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<tr>
<td>Traps</td>
<td>96</td>
<td>140</td>
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<tr>
<td>States</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Slide total</td>
<td>1263</td>
<td>1510</td>
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<tr>
<td>SBR-like</td>
<td>201</td>
<td>171</td>
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USDA Rust Positive Counties & Syngenta Spore Trap Network
May 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network
June 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network
July 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties
& Syngenta Spore Trap Network
August 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network September 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network
October 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network

November 2006

October 2006

USDA Data Sources: USDA PIPE Web Site
USDA Rust Positive Counties & Syngenta Spore Trap Network
November 2006

USDA Data Sources: USDA PIPE Web Site
Detection of *Phakopsora pachyrhizi* spores in rain using a real-time PCR assay

Valeria Avanzato, 2006
People

Les Szabo and Charlie Barnes

USDA-ARS Cereal Disease Laboratory
University of Minnesota

Funding provided by USDA-ARS and the United Soybean Board
People

Van Bowersox and Karen Harlin

Illinois State Water Survey
National Atmospheric Deposition Program/
National Trends Network
NADP Sites

110 sites
NADP Collectors

- Active, collects only
- Wet deposition
- Approximately 14” diameter
- Monitored weekly
Overview

✔ Detection of *Phakopsora pachyrhizi*
  ✔ Rain samples filtered
  ✔ DNA extracted from half filters
  ✔ Nested real-time PCR assay specific for
  *P. pachyrhizi*
Results

✓ 1,581 rain samples
✓ May 9 - August 29th
✓ 270 samples tested positive for *P. pachyrhizi*
✓ Turn around time was less than 3 weeks from the collection start date
Proportion of Relative qPCR Scores for 2006

Number of Positives

May        June           July           August

Relative Score

4  High
3
2
1  Trace
Number of Positive Samples
May 16 - Aug 29, 2006
270 of 1581 rain samples were positive (17%) for *P. pachyrhizi* in 2006.

- Positives were found in every state except North Dakota.
- A bimodal temporal pattern in spore deposition was observed.
- Highest frequency of detection and spore load was observed in August.
- No correlation between spore detection and amount of rain.
Summary

- Temporal pattern similar in 2005 and 2006
- Three fold increase in the number of positive samples in 2006 compared to 2005
- Spore load also increased in 2006 compared to 2005
Phakopsora pachyrhizi spores are widely distributed early in the season.

Highest concentrations in August and September.

Spore viability may be very low.