Evaluation of a seed treatment candidate for Downy Mildew

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My Research Focus

- Grew up on a farm in south central ND
- Bachelor’s degree in crop and weed science from NDSU
- Now a Ph.D plant pathology graduate student
  - Downy Mildew
  - Rust
Introduction

Pathogen
Plasmopara halstedii

Disease
Downy Mildew
Infection Process

motile zoospore

sunflower seedling

Systemically Infected Sunflower Plant

Gulya et al. 1997
Symptoms

Photo: Markell
Management

• Fungicide seed treatments
  – Metalaxyl and mefenoxam (FRAC 4) had efficacy until resistant *P. halstedii* isolates were found in the late 1990s
  – Azoxystrobin and fenamidone (FRAC 11) available for suppression of downy mildew
• High risk for resistance development
Objective

• Evaluate an experimental fungicide for management of downy mildew
Candidate Seed Treatment

- **Oxathiapiprolin**
  - New piperidinyl thiazole isoxazoline class of fungicides
  - Developed by DuPont
Candidate Seed Treatment

• Oxathiapiprolin
  – New piperidinyl thiazole isoxazoline class of fungicides
  – Developed by DuPont

Oxathiapiprolin is the first of the new piperidinyl thiazole isoxazoline class of fungicides discovered and developed by DuPont. Oxathiapiprolin represents a novel mode of action that offers growers new options for disease control in potatoes, grapes, vegetables and other specialty crops. Initial tests indicate outstanding performance in disease control and early crop establishment, even under heavy disease pressure.
Materials and Methods

- 2011-2013
  - Fargo
  - Carrington
  - Thompson

- Randomized Complete Block Design (RCBD)
  - Oil sunflower seeds – single row plots
  - 4 ratings (no yield data collected)

- Treatment rows inoculated pre-emergence
  - Inoculated with race 776
# Fungicide- Treatment List

<table>
<thead>
<tr>
<th>No.</th>
<th>Treatment</th>
<th>Rate (µg/target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oxathiapiprolin</td>
<td>9.37</td>
</tr>
<tr>
<td>2</td>
<td>Oxathiapiprolin</td>
<td>18.75</td>
</tr>
<tr>
<td>3</td>
<td>Oxathiapiprolin</td>
<td>37.50</td>
</tr>
<tr>
<td>4</td>
<td>Oxathiapiprolin, Fludioxonil, Mefenoxam</td>
<td>9.37, 2.5, 29.00</td>
</tr>
<tr>
<td>5</td>
<td>Azoxystrobin, Fludioxonil, Mefenoxam</td>
<td>100.00, 2.5, 29.00</td>
</tr>
<tr>
<td>6</td>
<td>Fenamidone</td>
<td>150.00</td>
</tr>
<tr>
<td>7</td>
<td>Non-inoculated, NTC</td>
<td>--------</td>
</tr>
<tr>
<td>8</td>
<td>Inoculated, NTC</td>
<td>--------</td>
</tr>
</tbody>
</table>

250ug of Thiamethoxam applied to every treatment
Evaluation and Data Collection

INCIDENCE

No Infection

Systemically Infected
Results- Fargo (round 1)

Growth Stage: R1

LSD=6.23, P<0.0001, analyzed using SAS v.9.3
Fargo
July 11, 2013
Late Vegetative Stage
Late Vegetative Stage on July 11, 2013

NTC

Oxathiapiprolin

Labeled
Results- Fargo (round 2)

Growth Stage: R4

# of non-infected plants

Ox. Low  Ox. Medium  Ox. High  Ox. Combo  Standard 1  Standard 2  Non-inoc., NTC  Inoc., NTC

LSD=6.86, P<0.0001, analyzed using SAS v.9.3
Results - Carrington

Growth Stage: R1

# of non-infected plants

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of Non-Infected Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ox. Low</td>
<td>a</td>
</tr>
<tr>
<td>Ox. Medium</td>
<td>a</td>
</tr>
<tr>
<td>Ox. High</td>
<td>a</td>
</tr>
<tr>
<td>Ox. Combo</td>
<td>a (highest)</td>
</tr>
<tr>
<td>Standard 1</td>
<td>b</td>
</tr>
<tr>
<td>Standard 2</td>
<td>a</td>
</tr>
<tr>
<td>Inoc., NTC</td>
<td>c</td>
</tr>
<tr>
<td>Inoc., NTC</td>
<td>c</td>
</tr>
</tbody>
</table>

LSD = 9.51, P < 0.0001, analyzed using SAS v.9.3

NDSU
Results - Thompson

Growth Stage: R1

LSD=4.66, P<0.0001, analyzed using SAS v.9.3

NDSU
Discussion

- All rates of Oxathiapiprolin were effective
- More testing planned for 2014
Acknowledgements

• National Sunflower Association
• DuPont
• NDSU Agriculture Experiment Station
• NDSU Extension Service
• NDSU Ext. Plant Path Group
• Carrington REC Group
Literature Cited

