Evaluation of Fungicide for Control of Sunflower Head Rot

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Discussion

• Overview of white mold in sunflower (head rot)
• Fungicide testing methodology
• Basic fungicide screening (ND and Manitoba)
• Enhancing fungicide with adjuvant
• Improving efficacy with increased spray volume
White Mold (Northern Plains)

- Caused by the pathogen *Sclerotinia sclerotiorum*
  - *Basal stalk rot*
  - *Mid stalk rot*
  - *Head rot (most economically devastating disease of sunflower)*
Managing head rot in sunflower

• The preferred and most effective way to manage head rot is through genetic resistance

• Sometimes resistance is not adequate and other management strategies need to be employed
Head Rot Biology

• Sunflower susceptible at flowering growth stage (R 5.1 – R 5.9)
• Infected by ascospores – same ascospores discharged from sclerotia so one needs wet soil about 10-12 days before sunflowers reach flowering growth stage.
• Cooperative environment – rain, high humidity, warm temperatures – disease progresses faster
Testing Fungicides on Sunflower

- Development of nursery
- Creating Infection
- Application of fungicides
- Measuring disease
- Measuring agronomic parameters
- Choice of hybrids
Evaluating Fungicide for Control of Sunflower Head Rot
Testing Success

• Partitioning parameters
• Sunflower pests
• Simultaneous flowering
• Control of the environment
Contrast Between Research Systems

**Langdon, ND**
- Confection type sunflower except 2010
- Ascospores
- Spray application (three nozzle boom elevated over the plot)
- Prairie pothole region

**Morden, Manitoba**
- Oilseed type sunflower
- Ascospores and mycelia grown on millet
- Single nozzle boom spraying left then right side of head
- Red River Valley
Head Rot Incidence by Fungicide, Langdon 2010

- Untreated: 75.2
- Headline: 69.3
- LEM17: 68.3
- Quash: 64.4
- Switch + Topsin FL: 60.5
Head Rot Incidence by Fungicide and Adjuvant, 2010

Untreated = 75.2

- Endura
- Proline
Disease Incidence by Confection Type Cultivar and Endura Fungicide Treatment, 2008

- Untreated
- no adjuvant
- 1 pt/a AG07015
- 2 fl oz/a + 0.5% v/v AG02013 + AG03015

Graph showing disease incidence across different treatments.
Disease Index by Spray Volume, 2007

- Endura 70 WDG
- Proline SC + Induce
- Prosaro 421 SC + Induce
- Topsin M 70% WP

Graph showing disease index with two sets of data points:
- 9.2 GPA
- 18.4 GPA
Effects of fungicides on sclerotinia head rot and sunflower yield at Morden Manitoba

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Morden Research Station
• **Short Term Objective:**
  Lack of genetic resistance to sclerotinia head rot
• Need to identify foliar fungicide applications to reduce the impact on sunflower yield & quality.
• Field trials at Morden Manitoba since 2004
• Susceptible oilseed hybrids
• Three treatments of each fungicide
• Applications at Early and/or Late flowering
• Sclerotinia inoculation 24 h after fungicides
• Head rot incidence and severity weekly
<table>
<thead>
<tr>
<th>Fungicides</th>
<th>Chemical % active</th>
<th>a.i / ha</th>
<th>Company</th>
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</thead>
<tbody>
<tr>
<td>Bravo</td>
<td>Chlorothalonil 50</td>
<td>1 kg</td>
<td>Syngenta</td>
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<tr>
<td>Dithane</td>
<td>Mancozeb 80 Ethyl carbamate</td>
<td>2.25 kg</td>
<td>Dow Agro</td>
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<td>Folicur</td>
<td>Tebuconazole 39</td>
<td>0.125 kg</td>
<td>BAYER</td>
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<td>Headline</td>
<td>Pyraclostrobin 25</td>
<td>0.15 kg</td>
<td>BASF</td>
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<tr>
<td>Lance</td>
<td>Boscalid 25</td>
<td>0.25 kg</td>
<td>BASF</td>
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<tr>
<td>LEM Exp.</td>
<td>DPX-LEM17</td>
<td>0.35 kg</td>
<td>DuPont</td>
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<tr>
<td>Proline</td>
<td>Prothioconazole 48</td>
<td>0.2 kg</td>
<td>BAYER</td>
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<tr>
<td>Stratego</td>
<td>Propiconazole/Trifloxystrobin12.5E</td>
<td>0.18 kg</td>
<td>BAYER</td>
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<tr>
<td>Tilt</td>
<td>Propiconazole 25</td>
<td>0.125 kg</td>
<td>Syngenta</td>
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<tr>
<td>BASF-516</td>
<td>Experimental</td>
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<td>BASF</td>
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<tr>
<td>USF-4876</td>
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<td>DPX-YT669</td>
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<td>DPX-Q8X63</td>
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<tr>
<td>Quash</td>
<td>Experimental (metconazole)</td>
<td>0.28 kg</td>
<td>VALENT</td>
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<td>BASF-703</td>
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<td>BASF</td>
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<tr>
<td>Topsin (Senator)</td>
<td>Thiophanate-methyle</td>
<td>1.5kg</td>
<td>EngageAgro</td>
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<tr>
<td>Serenade</td>
<td>Bacillus subtilis (Biocntrol)</td>
<td>5 kg</td>
<td>AgraQuest</td>
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<tr>
<td>Switch</td>
<td>Cyprodinil / Fluxdioxonil</td>
<td>0.6 kg</td>
<td>Syngenta</td>
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</table>
Effects of fungicides on sclerotinia head rot and yield in sunflower, Morden 2009
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Acknowledgements

• Winfield Solutions
• Bayer CropScience
• Kevin Misek
• Amanda Arens
• Blaine Schatz, CREC
• USDA-ARS Sclerotinia Initiative