Update: American Brown Rot and SI Fungicide Sensitivity Screening

Kimberley Lesniak, N. Rothwell, E. Lizotte, T. Proffer, and G. Sundin
2012 Orchard & Vineyard Show
24 Jan 12     Grand Traverse, MI
American Brown Rot (ABR): *Monilinia fructicola*

Wetting event ~ 75°F is ideal for infection

Industry relies on sterol demethylation inhibitor fungicides (SI’s) for control
What happened in 2011?

- **Observed heavy ABR infestations**
  - Caused by initial infections on green / immature fruit

- **Suspect cause of ABR infection on green fruit**
  - Initiation of Bacterial canker
  - Allowed early invasion of ABR through deteriorated tissue from canker infection
Brown Rot Fungicide Efficacy

- **Indar** (a.i. fenbuconazole) - has been, and continues to be the best fungicide for ABR management

- **48 oz seasonal limit**: (Section 24(c) label rate)
  - 12 oz. x 4 apps.
  - 8 oz. x 6 apps. etc....

- **Importance of “Indar math”**
  - Rate x application interval

- **ULTIMATE GOAL**:
  - Control brown rot fruit infection
  - With the least impact on potential development of fungicide resistance
Brown Rot Fungicide Efficacy

• We don’t have comparable alternatives to Indar

• But do have….
  – Pristine
    • Pyraclostrobin + boscalid
  – New SDHI’s
    • Targets a different site of pathogen

• GOAL:
  – Keep population size down
  – Manage fungicide resistance
  – Effectively use all the management tools we have to fulfill adequate control
Disease will win.....

when environmental conditions are optimal or when some factor boosts it
What has been surveyed in Michigan?

- **79 Orchards assayed**
  - 2008-2011
  - Northwest, Fruit Ridge, Southwest MI
  - Cherry (tarts and sweets) and Peach

- **1,039 isolates**

- *In vitro* fungicide analysis
Analysis of field isolates for SI sensitivity

Relative growth assay

– Comparison of growth on SI vs. control medium (%RG)
– Propiconazole (Orbit)

Resistance category basis:
1. Isolate resistant = ≥ 80% RG
2. Orchard shifting = 50-66% RG
3. Orchard resistant = ≥ 67% RG
   (Koller et al 1997)
## Overall ABR//SI survey results in Michigan

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of orchards</th>
<th>Number of isolates</th>
<th>Orchard average RG% of population</th>
<th>Range of individual isolate RG%</th>
<th>Region(s) within Michigan</th>
<th>Fruit crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>30</td>
<td>565</td>
<td>9-42%</td>
<td>0-78%</td>
<td>Northwest</td>
<td>Cherry</td>
</tr>
<tr>
<td>2009</td>
<td>6</td>
<td>76</td>
<td>10-34%</td>
<td>0-87%</td>
<td>Northwest Southwest</td>
<td>Cherry Peach</td>
</tr>
<tr>
<td>2010</td>
<td>35</td>
<td>304</td>
<td>3-56%</td>
<td>0-76%</td>
<td>Northwest Southwest Fruit Ridge</td>
<td>Cherry Peach</td>
</tr>
<tr>
<td>2011</td>
<td>8</td>
<td>94</td>
<td>33-75%</td>
<td>19-92%</td>
<td>Northwest</td>
<td>Cherry</td>
</tr>
</tbody>
</table>

1. Isolate resistant = $\geq 80\%$ RG  
2. Orchard shifting = 50-66% RG  
3. Orchard resistant = $\geq 67\%$ RG
# Northwest Michigan results

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of orchards</th>
<th>Number of isolates</th>
<th>Orchard average RG% of population</th>
<th>Range of individual isolate RG%</th>
<th>Region(s) within Michigan</th>
<th>Fruit crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>30</td>
<td>565</td>
<td>9-42%</td>
<td>0-78%</td>
<td>Northwest</td>
<td>Cherry</td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>26</td>
<td>36%</td>
<td>7-68%</td>
<td>Northwest</td>
<td>Peach</td>
</tr>
<tr>
<td>2010</td>
<td>20</td>
<td>172</td>
<td>3-48%</td>
<td>0-65%</td>
<td>Northwest</td>
<td>Cherry</td>
</tr>
<tr>
<td>2011</td>
<td>8</td>
<td>94</td>
<td>33-75%</td>
<td>19-92%</td>
<td>Northwest</td>
<td>Cherry</td>
</tr>
</tbody>
</table>

1. Isolate resistant = ≥ 80% RG  
2. Orchard shifting = 50-66% RG  
3. Orchard resistant = ≥ 67% RG
Big Picture in Michigan Orchards

- 2011 first time reduced SI sensitivity found in NW Michigan
  - 3 resistant isolates
  - 1 shifted and 1 resistant orchard

- SW Michigan:
  - 1 resistant isolate (2009) and 2 orchards shifting in SI sensitivity (2010)

- Overall, only:
  - 4 of 1,039 isolates R
  - 4 of 79 orchards shifting

  = ABR populations continue to be sensitive to SI’s
Management recommendations in Michigan orchards

- Adequate coverage of SI applications

- SI’s = Quantitative resistance
  - Higher rates and shorter intervals may provide control
  - Section 24(c) label – allows higher application rates
  - **Not** a long-term solution for management

- SDHI’s are an option under low and moderate disease pressure

- Michigan isolates continue to be sensitive to SI’s after 20 years of application
Acknowledgements

Nikki Rothwell
Erin Lizotte
Bill Shane
Phil Schwallier
Amy Irish-Brown

Michigan Cherry Committee
MSU Project GREEEN
SI’s and Population Shifts
SI’s and Population Shifts

Relative Fungal Growth
SI’s and Population Shifts

Relative Fungal Growth
Brown Rot and SI’s in Michigan, 2010

• Couple of things in our favor looking ahead:

• Section 24(c) label for Indar 2F for Michigan

• Use up to 12 fl oz/Acre
• 48 fl oz/Acre seasonal use rate
Brown Rot and SI’s in Michigan, 2010

• Couple of things in our favor looking ahead:
  • Section 24(c) label for Indar 2F for Michigan
  • Use up to 12 fl oz/Acre
  • 48 fl oz/Acre seasonal use rate