The Influence of Powdery Mildew on Pecan Nut Quality

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Pecan Scab
Several diseases at same time.
Powdery Mildew

The fungus *Microsphaera penicillata* (Wallr.:Fr.) Lev causes powdery mildew of pecan.

On pecan, powdery mildew primarily appears mid-to-late season and will generally only affect fruit, but can be found on leaflets occasionally.

Powdery mildew can occur sporadically and may not be present each year.
Powdery Mildew

Gottwald et al. (1984) found that powdery mildew had no effect on net photosynthesis or dark respiration of nuts, but 50% coverage on the shuck reduced kernel oil, protein, and free fatty acids.
Powdery Mildew

Brenneman and Bertrand (1989) reported that disease levels were significantly negatively correlated with kernel weight, but the percent fill of nuts were not correlated with disease severity.
Powdery Mildew

Olsen et al. (2003) reported no significant differences in nut weight, kernel weight, percent fill, or kernel color ratings on infected and non-infected ‘Wichita’ and ‘Western’ pecan varieties.
Pecan Cultivars Susceptible to Powdery Mildew

- Curtis
- Desirable
- Farley
- Moore
- Pabst
- Wichita
- Western
Initial infection
Advanced infection
SHUCK
DECLINE
Shuck Decline
Shuck Dieback
Tulip Disease

Stem-end
Blight
Pecan Cultivars Most Susceptible to Shuck Decline

- Success
- Desirable
- Forkert
- Choctaw
- Pawnee
- Oconee
- Creek
TEST CONDITIONS
Orchard Description

- Orchard planted in 2005.
- Six cultivars: Caddo, Desirable, Elliott, Nacono, Oconee, Pawnee
- Only 4 fungicide applications: Prophyte, Elast, Super Tin, Agri-fos
Data Collection

- 25 random nuts of uninfected, powdery mildew infected, and with shuck decline symptoms collected from each individual tree.

- Four replicant trees for each cultivar.

- Individual nut length, nut diameter, nut weight, kernel weight, oil content.
RESULTS
Desirable
# ‘Desirable’ Pecan

<table>
<thead>
<tr>
<th>TRT</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>44.27 a</td>
<td>24.22 a</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>42.92 b</td>
<td>23.84 a</td>
</tr>
<tr>
<td>Shuck Decline</td>
<td>42.95 b</td>
<td>23.91 a</td>
</tr>
</tbody>
</table>
## ‘Desirable’ Pecan

<table>
<thead>
<tr>
<th>TRT</th>
<th>Nut Weight</th>
<th>Kernel Weight</th>
<th>Percent Kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>10.29 a</td>
<td>5.48 a</td>
<td>53.17 b</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>9.47 b</td>
<td>5.20 b</td>
<td>54.85 a</td>
</tr>
<tr>
<td>Shuck Decline</td>
<td>9.67 b</td>
<td>5.26 ab</td>
<td>54.32 ab</td>
</tr>
</tbody>
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### ‘Desirable’ Pecan

<table>
<thead>
<tr>
<th>TRT</th>
<th>Nuts/lb</th>
<th>% Oil</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>44 a</td>
<td>67 a</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>48 b</td>
<td>64 a</td>
</tr>
<tr>
<td>Shuck Decline</td>
<td>47 b</td>
<td>62 a</td>
</tr>
</tbody>
</table>
Oconee
<table>
<thead>
<tr>
<th>TRT</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>48.74 a</td>
<td>22.54 a</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>48.08 a</td>
<td>22.21 b</td>
</tr>
<tr>
<td>Shuck Decline</td>
<td>47.20 a</td>
<td>22.09 b</td>
</tr>
</tbody>
</table>

‘Oconee’ Pecan
<table>
<thead>
<tr>
<th>TRT</th>
<th>Nut Weight</th>
<th>Kernel Weight</th>
<th>Percent Kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>9.79 a</td>
<td>5.69 a</td>
<td>57.83 a</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>9.12 b</td>
<td>5.32 b</td>
<td>58.02 a</td>
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<tr>
<td>Shuck Decline</td>
<td>8.67 b</td>
<td>4.98 b</td>
<td>57.23 a</td>
</tr>
<tr>
<td>TRT</td>
<td>Nuts/lb</td>
<td>% Oil</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>46 a</td>
<td>71 a</td>
<td></td>
</tr>
<tr>
<td>P. Mildew</td>
<td>50 b</td>
<td>72 a</td>
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<tr>
<td>Shuck Decline</td>
<td>52 b</td>
<td>70 a</td>
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Control

Powdery Mildew

Shuck Decline

Pawnee
## ‘Pawnee’ Pecan

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<tr>
<td>Control</td>
<td>47.22 a</td>
<td>23.90 a</td>
</tr>
<tr>
<td>P. Mildew</td>
<td>45.44 a</td>
<td>23.43 a</td>
</tr>
<tr>
<td>Shuck Decline</td>
<td>46.15 a</td>
<td>23.60 a</td>
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<td>5.50 a</td>
<td>59.29 a</td>
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<td>P. Mildew</td>
<td>8.76 a</td>
<td>5.32 a</td>
<td>60.84 a</td>
</tr>
<tr>
<td>Shuck Dieback</td>
<td>9.03 a</td>
<td>5.40 a</td>
<td>59.74 a</td>
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<td>74 a</td>
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<td>P. Mildew</td>
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<td>74 a</td>
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PECAN CULTIVAR SUSCEPTIBILITY
Powdery Mildew

Tolerant

- Caddo
- Gloria Grande
- Kiowa
- Moreland
- P-Cou 2
- Sumner

Susceptible

- Jackson
- Littlepage
- Maramec
- Pawnee

Highly Susceptible

- Curtis
- Desirable
- Forkert
- Melrose
- Nacono
- Oconee
- Schley
Powdery Mildew

Many growers regularly spraying for scab are surprised to see powdery mildew development on their nuts.

Many of the fungicides that are effective for scab are not effective in controlling powdery mildew.
Fungicides Labeled

• Group 30, organotin
• Group 3, DMI’s
• Group M, guinidine acetate
• Group 11, strobilurin
• Group 1, thiophanate-methyl
• Group 33, phosphonates
• Group 6, G3 & G11 Mixtures
Fungicides Labeled

- Agri-Tin, Super Tin 4L, Super Tin 80WP
- Enable, Orbit, Propimax, Bumper
- Elast 400F
- Abound, Sovran, Headline
- T Methyl 70 WSB, Topsin-M
- Agri-fos, Fosphite, ProPhyte, Rampart
- Stratego, Quilt
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• Stratego, Quilt
Powdery Mildew

- **Desirable Pecan** – significantly reduced nut length, nut weight, kernel weight, nuts/lb, and oil content.

- **Oconee Pecan** – significantly reduced nut diameter, nut weight, kernel weight, and nuts/lb.

- **Pawnee Pecan** – severe infection of powdery mildew had no significant effect on any of the measured quality parameters.
Summary

- Powdery Mildew infection is sporadic in occurrence and not considered a significant economic problem, therefore specific fungicide application for powdery mildew control is not recommended.

- Fungicide choice for pecan scab control will impact powdery mildew infection.