Identifying and Understanding Common Pecan Diseases

&

Understanding How to Use the Ag Chemical Manual to Control Pecan Diseases

Jason Brock
Dept. of Plant Pathology
University of Georgia
Tifton, GA
Identifying and Understanding Common Pecan Diseases
- Pecans in Georgia
- Pecan Diseases
- Pecan Scab

Understanding How to Use the Ag Chemical Manual to Control Pecan Diseases
- Scab management
- Fungicide selection
Pecan Diseases
Powdery Mildew
Microsphaera penicillata
Powdery Mildew
*Microsphaera penicillata*

- Damage is unclear.
- Most data shows little effect.
- Up to 17% reduction in kernel weight.
- Early infections most damaging.
Xylella Leaf Scorch

*Xylella fastidiosa*

- Xylem-limited bacterium
- Transmission
  - Xylem-feeding insects (sharpshooter leafhoppers or spittlebugs)
  - Grafting
- Generally associated with Cape Fear.
- Multiple cultivars known to be susceptible.
Xylella Leaf Scorch
*Xylella fastidiosa*

- Well defined lesions
- Along margins
- 1st on older leaflets
Xylella Leaf Scorch
*Xylella fastidiosa*

- No true control measures.
- Reduce stress to tree
  - Irrigation; fruit thinning; tree removal
ANTHRACNOSE

Glomerella cingulata
32. Leaf scorch on leaflets of the pecan cultivar Desirable. (Courtesy R. Worley)
Any scab program

downy spot

leaf scab

powdery mildew

Topsin-M

DMIs

Strobilurins

Phosphite

strobilurins

Phytophthora

TPTH

Anthracnose:

strobilurins

phosphites
PECAN SCAB

Venturia effusa

the driving force in disease management
Pecan Scab
Pecan Scab
Leaf Scab Control

- Bud break to Nut Set
- By nut set, leaves mature
Nut Growth and Damage Potential

JUNE SCAB

JULY SCAB

AUG.- SEPT. SCAB
Pecan Scab Symptoms

SPRAYED

UNSPRAYED
Pecan Scab Management
Pecan Disease Management

- Cultivars
- Site selection and spacing
- Fertility
- Irrigation
- Fungicides
Establishing a Pecan Orchard
Lenny Wells, UGA Extension Horticulturist – Pecans

One of the most important decisions a pecan producer makes is about the establishment of a new orchard. A well-planned, organized orchard will be more efficient, require less input and offer larger potential returns. Select the orchard location based on its soil type, drainage, water table and land topography. Straight rows in planted orchards make maintenance, irrigation and harvest easier. Tree growth and spacing requirements can also be anticipated for the early planting and subsequent orchard thinnings.

Cultural Management of Commercial Pecan Orchards

Lenny Wells, University of Georgia, Extension Horticulturist
Will Hudson, University of Georgia, Extension Entomologist
James Vickers, University of Georgia, Extension Plant Pathologist
Pecan Scab Management

- **Host Resistance**
  - Most effective
  - Pathogen is cultivar specific.
  - Host resistance might not be stable
  - Recommendations may vary by region.
  - Other host characteristics are also important.
Pecan Varieties for Georgia Orchards

By Lenny Wells and Patrick Conner, Department of Horticulture

Establishing a new orchard or renovating an older orchard is an exciting time for a pecan grower because it provides an opportunity to significantly improve the productivity of the farm. However, choosing which cultivars to plant can be one of the most difficult decisions a grower has to make. Pecan cultivars vary widely in yield potential, nut quality, date of maturity, tree form and resistance to insects to consider when selecting a variety are pollination type, disease resistance, alternate bearing potential, precocity (the bearing age of the tree), harvest date, pollination type, nut size, and nut quality.

Cultivars

Pollination

Table 1. Characteristics of Pecan Cultivars Recommended

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Parentage</th>
<th>Dichogamy²</th>
<th>Nuts Per Pound³</th>
<th>Percent Kernel³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caddo</td>
<td>Brooks x Alley</td>
<td>I</td>
<td>67</td>
<td>54</td>
</tr>
<tr>
<td>Desirable</td>
<td>Success x Jewett</td>
<td>I</td>
<td>48</td>
<td>51</td>
</tr>
<tr>
<td>Elliott</td>
<td>Seedling</td>
<td>II</td>
<td>77</td>
<td>51</td>
</tr>
<tr>
<td>Forkert</td>
<td>Success x Schley</td>
<td>II</td>
<td>53</td>
<td>58</td>
</tr>
<tr>
<td>Kanza</td>
<td>Major x Shoshoni</td>
<td>II</td>
<td>74</td>
<td>52</td>
</tr>
<tr>
<td>Ocone</td>
<td>Schley x Barton</td>
<td>II</td>
<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Pawnee</td>
<td>Mohawk x Starking HG</td>
<td>I</td>
<td>56</td>
<td>54</td>
</tr>
<tr>
<td>Sumner</td>
<td>Schley Seedling</td>
<td>II</td>
<td>56</td>
<td>49</td>
</tr>
</tbody>
</table>

Cultivars Recommended for Georgia¹

Amling
So far, this selection has beautiful dark green foliage and excellent resistance to most pests. The medium-sized nuts have a high quality kernel and are easy to shell. Although this cultivar is considered by some to have low yield potential, it is too early to tell in our trees at this point. This appears to be a good cultivar for a yard tree as the nuts are high quality and pest problems are few. It would also be well suited to organic or low-input applications. A limitation to this cultivar is that it has only medium-sized nuts.
Location and Spacing

The goal is to increase air movement and sunlight throughout the canopy.

One of the most important decisions a pecan producer makes is about the establishment of a new orchard. A well-planned, organized orchard will be more efficient, require less input and offer larger potential returns. Select the orchard location based on its soil type, drainage, water table and land topography. Straight rows in planted orchards make maintenance, irrigation and harvest easier. Tree growth and spacing requirements can also be anticipated for the early planting and subsequent orchard thinnings.
Pecan Scab Management

- Fungicide applications
  - 5 to 15 per season in Georgia
  - Bud break through shell hardening
    (April – late August)
Fungicides for Management of Pecan Diseases
<table>
<thead>
<tr>
<th>Class</th>
<th>Count</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMIs (triazoles, sterol inhibitors)</td>
<td>3</td>
<td>Orbit, Propimax, Bumper, Enable, Quash, Folicur, Tebuzol, Toledo, Monsoon, Topguard Absolute, Quilt, Quilt Xcel, Quadris Top, Custodia, Minerva Duo, TopsinXTR2, Viathon, TopguardEQ</td>
</tr>
<tr>
<td>Qols (strobilurins)</td>
<td>11</td>
<td>Abound, Azaka, Sovran, Headline, Absolute, Quadris Top, Quilt, Quilt Xcel, Custodia, TopguardEQ</td>
</tr>
<tr>
<td>Guanidines</td>
<td>U12</td>
<td>Elast</td>
</tr>
<tr>
<td>Organo-metallics</td>
<td>30</td>
<td>Super Tin, Agri Tin, Minerva Duo</td>
</tr>
<tr>
<td>Phosphonates</td>
<td>33</td>
<td>Phostrol, ProPhyt, FungiPhite, Reliant, Fosphite, Kphite, Phiticide, Rampart, Topaz, Viathon</td>
</tr>
<tr>
<td>MBCs (thiophanates)</td>
<td>1</td>
<td>Topsin; T-methyl, TopsinXTR2</td>
</tr>
</tbody>
</table>
# PECAN DISEASE CONTROL

Jason Brock and Tim Branaman, Department of Plant Pathology

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>CHEMICAL &amp; FORMULATION</th>
<th>MOA</th>
<th>RATE/ACRE</th>
<th>REI/PHI (Hours/Days)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scab; Downy Spot</td>
<td>azoxystrobin</td>
<td>11</td>
<td>6-12 fl oz</td>
<td>45 D</td>
<td>See info below. MOA Group 11.</td>
</tr>
<tr>
<td></td>
<td>Azaka</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>difenoconazole + azoxystrobin</td>
<td>3 + 11</td>
<td>10-14 fl oz</td>
<td>12 H/ 45 D</td>
<td>See info below. MOA Group 3.</td>
</tr>
<tr>
<td></td>
<td>Quadris Top</td>
<td></td>
<td></td>
<td></td>
<td>See info below. MOA Group 11.</td>
</tr>
<tr>
<td></td>
<td>difenoconazole + azoxystrobin</td>
<td>3 + 11</td>
<td>8-14 fl oz</td>
<td>12 H/ 21 D</td>
<td>See info below. MOA Group 11.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>dodine</td>
<td>U12 + 3</td>
<td>25 fl oz half rate</td>
<td>48 H/</td>
<td>For any tank mix combination of Elast, TPTH, or a group 3 fungicide, the rates provided are the lowest recommended and will provide excellent control of scab under most conditions. When disease pressure is elevated, the rate of either mixing partner can be increased.</td>
</tr>
<tr>
<td></td>
<td>Elasti 400F + FRAC group 3 fungicide</td>
<td></td>
<td></td>
<td></td>
<td>See info below. MOA Group 3.</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See info below. MOA Group 30.</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See info below. MOA Group U12.</td>
</tr>
<tr>
<td></td>
<td>fenbuconazole</td>
<td>3</td>
<td>8 fl oz</td>
<td>12 H/</td>
<td>Do not apply after shuck split or within 28 D of harvest</td>
</tr>
<tr>
<td></td>
<td>Enable 2F</td>
<td></td>
<td></td>
<td></td>
<td>See info below. MOA Group 3.</td>
</tr>
<tr>
<td></td>
<td>kresoxim-methyl</td>
<td>11</td>
<td>2.4-3.2 fl oz</td>
<td>12 H/ 45 D</td>
<td>See info below. MOA Group 11.</td>
</tr>
<tr>
<td></td>
<td>Sovran</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>metconazole</td>
<td>3</td>
<td>2.5-3.5 oz/A</td>
<td>12 H/ 25 D</td>
<td>See info below. MOA Group 3.</td>
</tr>
<tr>
<td></td>
<td>Quash</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>phosphorous acid</td>
<td>33</td>
<td>2-5 pt</td>
<td>4 H/</td>
<td>See info below. MOA Group 33.</td>
</tr>
<tr>
<td></td>
<td>Phostrol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ProPhy</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Fungilife</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reliant</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**MOA Group 3:** Resistance risk is moderate. For best results, tank mix tebuconazole with a surfactant. Do not add a surfactant if mixing with other fungicides. Increasing the rate of a Group 3 fungicide will be important if reduced sensitivity is known or suspected. Stand-alone use is not recommended where reduced sensitivity is known or suspected.

**MOA Group 11:** Resistance risk is moderate. Do not make more than 2 sequential applications. If only using solo products, group 11 fungicides should not be used in more than 1/3 of the total number of fungicide applications. If using group 3 tank-mixed with other modes of action, they should not be used in more than 1/2 of the total number of fungicide applications.

**MOA Group 30:** Resistance risk is low. For best control apply in 100 gpa by ground. Do not apply in consecutive applications. Three to five applications are generally recommended. There is currently an unresolved issue regarding potential residues of these products in tree nuts exported to the EU. Growers who know their crop is going to that market should avoid use until the issue is resolved. Check labels for potential limitations on maximum number of applications or amount of active ingredient allowed per season. Do not use when there is a phosphate deficiency.

**MOA Group U12:** Resistance risk is low. Do not use on Moore, Van Deman, Barton, or Shawnee. Do not use a surfactant. Do not use with foliar zinc treatments.

*UGA Extension Bulletin 841 • 2018 Commercial Pecan Spray Guide*
Thiophanates (FRAC Group 1)

- Topsin M

- Resistance risk: HIGH

- Do not apply more than 1 to 2 applications

- Always use in a tank mix.
Thiophanates (FRAC Group 1)

- **Best Use:**
  - Early season for leaf scab
  - May/Jun application for anthracnose and scab
  - Nut scab
Triazoles (DMIs)  FRAC Group 3

- Resistance risk: MEDIUM

- Shifts in sensitivity dating back 20 years

- Do not follow full rate applications with reduced rates at later date

- Best use: leaf scab; powdery mildew; zonate leaf spot
Strobilurin Fungicides (QoIs; FRAC Group 11)

- Resistance risk: MEDIUM
- Limit of a.i. according to label
- No more than 2 consecutive applications
- 4 to 6; if making ≥ 12 applications
- Do not over use.
**Strobilurin Fungicides (QoIs; FRAC Group 11)**

- **Solo QoI products**: no more than 1/3 of the total number of fungicide applications
- **Solo QoI’s and/or mixes**: no more than 1/2 of the total number of fungicide applications
- **Best use**: foliar diseases; nut scab
Dodine  (FRAC Group U12)

- Resistance risk: LOW to MODERATE
- Elast
- Do not apply more than 6 applications/year.
- Best use: nut scab
TPTH  (FRAC Group 30)

- Resistance risk: LOW to MODERATE

- Super Tin; Agri Tin

- Do not exceed 45 oz. or 72 fl. oz./year.

- Best Use: nut scab
Phosphononates (FRAC Group 33)

- Resistance risk: LOW

- Phosphorous acid salts

- Up to 5 nonconsecutive applications

- Best use: leaf scab; can be added to nut scab sprays
Pre-pollination Sprays

- ≤ 5
- ≤ 3 is more common
  1. Group 11 or 11+3
  2. Phosphite
  3. Group 11 or 11+3
Pre-pollination Sprays

- ≤ 5
- ≤ 3 is more common
  1. Group 11 or 11+3
  2. Phosphite
  3. Group 11 or 11+3
  4. and/or 5. (TPTH + DMI) or Phosphite
Post-Pollination

- Most critical time for control of scab.
- Shucks remain susceptible.
- Like leaf scab, some options better than others.
Post-Pollination

- Tin
- Elast
- Tin + Elast
Post-Pollination

- Tin
- Elast
- Tin + Elast

+ DMI
or
+ Phosphite
Post-Pollination

- Tin
- Elast
- Tin + Elast

Groups 11+3
Group 11

+ DMI
or
+ Phosphite
Post-Pollination

- Groups 11+3 or Group 11
- Groups 11+3 or Group 11
- Phosphite
- Groups 11+3 or Group 11
- Phosphite
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Spray Coverage

The Biggest Obstacle
AIR BLAST SPRAYING

UNIFORM COVERAGE
Georgia produces about 30% of U.S. pecans.
Georgia continues to be regarded as the top pecan producing state in the U.S., with over 170,000 acres planted (~140,000 producing).

Estimates indicate somewhere around 20,000-25,000 new acres have been planted over the last 5 years (2012-2016) in Georgia.
- Export market
  - China
  - India, Turkey, and South Korea
- Federal Marketing Order
  - Impact for domestic consumption
- Solid, consistent supply of pecans.