DISEASE AND FUNGICIDE MANAGEMENT IN SOYBEAN

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Disease Pyramid

1. **Plant** → susceptible variety
2. **Pathogen** → influenced by field history, location, etc.
3. **Environment** → promotes disease development

For **yield loss** to be an issue

4. **Time** → all 3 factors have to occur at a critical time/growth stage
Potential Yield Savings with Fungicide based on Cultivar Susceptibility
## Variety Selection - UTcrops.com resources

### 2015 Maturity Group V Data

| MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS Brand/Variety | MS 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Potential Yield Savings with Fungicide based on Cultivar Susceptibility
## MANAGEMENT TIPS FOR THROUGHOUT THE GROWING SEASON

### DISEASE CONTROL

<table>
<thead>
<tr>
<th>Disease</th>
<th>Varietal resistance</th>
<th>Foliar fungicide</th>
<th>Incidence</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frogeye Leaf Spot</td>
<td>Yes</td>
<td>Yes</td>
<td>Warm, wet conditions</td>
<td>Resistance to strobilurin fungicides has been identified</td>
</tr>
<tr>
<td>Septoria Brown Spot</td>
<td>Yes</td>
<td>Yes</td>
<td>Warm, wet conditions</td>
<td>Use less-susceptible varieties and fungicides as needed</td>
</tr>
<tr>
<td>Sudden Death Syndrome</td>
<td>Yes</td>
<td>No</td>
<td>Cool, wet conditions and early planting</td>
<td>Use less-susceptible varieties; certain nematicide seed treatments may help reduce infection</td>
</tr>
<tr>
<td>Southern Stem Canker</td>
<td>Yes</td>
<td>No</td>
<td>Moderately dry, warmer conditions and continuous soybean</td>
<td>Use less-susceptible varieties; crop rotation</td>
</tr>
<tr>
<td>Charcoal Rot</td>
<td>No</td>
<td>No</td>
<td>Very dry, hot conditions</td>
<td>Prevent/reduce plant stress</td>
</tr>
</tbody>
</table>

Table 1
Soybean Diseases

Frogeye Leaf Spot (FLS)
*Cercospora sojina*
Frogeye Leaf Spot (FLS) – Fungicide Resistance

- FLS fungus (*Cercospora sojina*) has become resistant to QoI/Strobilurin fungicides
- Label look up at cdms or Agrian websites
QoI Fungicide Resistance in TN

*Free testing for fungicide resistance
For information go to UTcrops.com → Soybean Disease and Nematode section
Fungicide Resistance

- Influenced by:
  - **Mode of action of the fungicide**
    (single site or multi-site)
  - **Biology of the pathogen**
    (high rates of reproduction = higher risk to develop fungicide resistance)
  - **Fungicide use pattern**
    (frequent, exclusive usage of at-risk fungicides increase risk of resistance development)
  - **Cropping system**
    (practices that increase disease pressure also increase risk of resistance development)
Fungicide Resistance: The Assessment of Risk

From www.frac.info

Product Name
Quadris, Evito, Headline, Pristine
Quadris Top, Priaxor (combos)
Caramba, Tilt,
Maneb, Captan, Bravo, Chloronil, Defiant

Fungicide Risk

Pathogen Risk

From www.frac.info
• Fungicide Groups
  - created by the Fungicide Resistance Action Committee (FRAC)
• Based on fungicides cross resistance behavior
Foliar Fungicides

- Chemical classes and Fungicide Resistance Action Committee (FRAC) codes (www.frac.info)
  - Quinone outside inhibitors (QoI; strobilurin) FRAC 11
  - Demethylation inhibitors (DMI; triazoles) FRAC 3
  - Succinate dehydrogenase inhibitors (SDHI) FRAC 7
  - Methy benzimidazole carbamates (MBC) FRAC 1
  - Multi-site contact activity (i.e. chloronitriles) FRAC M5
# Fungicide Resistance: The Assessment of Risk

<table>
<thead>
<tr>
<th>FRAC Group</th>
<th>Product Name</th>
<th>Pathogen Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk: 11 and 1</td>
<td>Quadris, Evito, Headline, Pristine</td>
<td></td>
</tr>
<tr>
<td>High to Medium Risk: 7</td>
<td>Priaxor (combo)</td>
<td></td>
</tr>
<tr>
<td>Medium Risk: 3</td>
<td>Caramba, Tilt</td>
<td></td>
</tr>
<tr>
<td>Low Risk: M5</td>
<td>Maneb, Captan, Bravo, Chloronil, Defiant</td>
<td></td>
</tr>
</tbody>
</table>

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### Fungicide Risk

**High**
- Benzimidazoles
- Qols
- Phenylamides
- Dicarboximides

- Level: 3
- Level: 6
- Level: 9

**Medium**
- Carboxanilides
- DMIls
- Phenylpyroles
- Phosphorothiates
- Anilopyrimidines
- MBI-0s

- Level: 2
- Level: 4
- Level: 6

**Low**
- Coppers, sulphur
- Chlorothalonil
- Dithiocarbamates
- Phthalimides
- MBI-Rs
- Probenazole

- Level: 0.5
- Level: 0.5
- Level: 1
- Level: 1.5

### Pathogen Risk

- **Low**
  - Rhizoctonia
  - Rusts
  - Soil borne pathogens
  - Smuts & Bunts

- **Medium**
  - Eyespot
  - Mycosphaerella graminicola

- **High**
  - Botrytis
  - Blumeria
  - Magnaporthe
  - Venturia
  - Plasmopara
  - Penicillium
  - M. fijiensis
  - Phytophthora infestans

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From [www.frac.info](http://www.frac.info)
Fungicide Resistance

- Influenced by:
  - **Mode of action of the fungicide**
    (single site or multi-site)
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    (high rates of reproduction = higher risk to develop fungicide resistance)
  - **Fungicide use pattern**
    (frequent, exclusive usage of at-risk fungicides increase risk of resistance development)
  - **Cropping system**
    (practices that increase disease pressure also increase risk of resistance development)
Fungicide Use Pattern

- Follow label rate and achieve good coverage
- Avoid multiple sprays of fungicides in the same fungicide group
- Use combination products for single applications in a season
- Alternate solo products/fungicide groups when applying more than one application in a season
- Use best fungicide to manage the specific disease(s) in your field and only apply when justified (based on disease risk and scouting)
Management of Soybean Diseases
Foliar Fungicide Efficacy for Control of Foliar Soybean Diseases — April 2015

Heather M. Kelly
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Department of Entomology and Plant Pathology

The North Central Regional Committee on Soybean Diseases (NCRERA-137) has developed the following information on foliar fungicide efficacy for control of major foliar soybean diseases in the United States. Efficacy ratings for each fungicide listed in the table were determined by field-testing the materials over multiple years and locations by the members of the committee. Efficacy ratings are based upon level of disease control achieved by product and are not necessarily reflective of yield increases obtained from product application. Efficacy depends upon proper application timing, rate and application method to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table, unless otherwise noted. Table includes systemic fungicides available that have been tested over multiple years and locations. The table is not intended to be a list of all labeled products. Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; NL=Not Labeled for use against this disease; U=Unknown efficacy or insufficient data to rank product efficacy.

<table>
<thead>
<tr>
<th>Fungicide(s)</th>
<th>Class</th>
<th>Active ingredient (%)</th>
<th>Product/Trade name</th>
<th>Rate/A (Fl oz)</th>
<th>Aerial wettness</th>
<th>Anthracnose</th>
<th>Brown spot</th>
<th>Cercospora leaf blight</th>
<th>Frogeye leaf spot</th>
<th>Phomopsis/ Diaporthe (Pod and stem blight)</th>
<th>Soybean rust</th>
<th>White mold</th>
<th>Harvest restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azoxytrobin 22.9%</td>
<td>Q11</td>
<td>Quadris 2.08 SC</td>
<td>6.0 - 15.5</td>
<td>VG</td>
<td>VG</td>
<td>G</td>
<td>F</td>
<td>P</td>
<td>U</td>
<td>G-VG</td>
<td>P</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Fluoxastrobin 40.3%</td>
<td>Q11</td>
<td>Aftershock 480 SC Evert 480 SC</td>
<td>2.0 - 5.7</td>
<td>VG</td>
<td>G</td>
<td>G</td>
<td>F</td>
<td>P</td>
<td>U</td>
<td>U</td>
<td>NL</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin</td>
<td>Q11</td>
<td>Approach 2.08 SC</td>
<td>6.0 - 12.0</td>
<td>VG</td>
<td>G</td>
<td>G</td>
<td>F</td>
<td>P</td>
<td>U</td>
<td>G</td>
<td>G*</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Pyraclostrobin 23.6%</td>
<td>Q11</td>
<td>Headline 2.09 EC/SC</td>
<td>6.0 - 12.0</td>
<td>VG</td>
<td>VG</td>
<td>G</td>
<td>F</td>
<td>P</td>
<td>U</td>
<td>VG</td>
<td>NL</td>
<td>21 days</td>
<td></td>
</tr>
<tr>
<td>Cyproconazole 8.9%</td>
<td>Q11</td>
<td>Alto 100SL</td>
<td>2.75 - 5.5</td>
<td>U</td>
<td>U</td>
<td>VG</td>
<td>F</td>
<td>F</td>
<td>U</td>
<td>VG</td>
<td>NL</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Flutriafol 11.8%</td>
<td>Q11</td>
<td>Topguard 1.04 SC</td>
<td>7.0 - 16.0</td>
<td>U</td>
<td>VG</td>
<td>VG</td>
<td>F</td>
<td>VG</td>
<td>U</td>
<td>VG-E</td>
<td>F</td>
<td>21 days</td>
<td></td>
</tr>
<tr>
<td>Propiconazole 41.8%</td>
<td>Q11</td>
<td>Tilt 3.6 EC Multiple Generics</td>
<td>2.0 - 4.0</td>
<td>P</td>
<td>VG</td>
<td>G</td>
<td>NL</td>
<td>F</td>
<td>NL</td>
<td>VG</td>
<td>NL</td>
<td>21 days</td>
<td></td>
</tr>
<tr>
<td>Propiconazole 41.0%</td>
<td>Q11</td>
<td>Prolin 480 SC</td>
<td>5.0 - 5.7</td>
<td>NL</td>
<td>NL</td>
<td>NL</td>
<td>NL</td>
<td>G-VG</td>
<td>NL</td>
<td>VG</td>
<td>F</td>
<td>21 days</td>
<td></td>
</tr>
<tr>
<td>Tetraconazole 20.0%</td>
<td>Q11</td>
<td>Domark 230 ME Multiple Generics</td>
<td>4.0 - 5.0</td>
<td>NL</td>
<td>VG</td>
<td>VG</td>
<td>F</td>
<td>G</td>
<td>U</td>
<td>VG-E</td>
<td>F</td>
<td>21 days</td>
<td></td>
</tr>
<tr>
<td>Thiophanate-methyl</td>
<td>Q11</td>
<td>Topspin-M Multiple Generics</td>
<td>10.0 - 20.0</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>F</td>
<td>VG</td>
<td>U</td>
<td>G</td>
<td>F</td>
<td>21 days</td>
<td></td>
</tr>
</tbody>
</table>
Managing Fungicide Use

• **One** of the important tools to manage disease
• Will not cure existing disease symptoms
• Use best fungicide to manage the *specific disease(s)* in your field

• Applications should be based upon:
  − Disease risk
  − Scouting observations

• Consistent economic benefits are more likely when based upon: Disease risk and Scouting observations
Resistant Management Strategies are Good Disease Management Strategies

• Use ALL the tools for disease management:
  − Crop rotation
  − Proper soil fertility
  − Resistant varieties
  − ID disease problems
  − Use best matched fungicide
  − Apply fungicide when justified
  − Achieve good coverage
  − Use combo products and/or alternate between solo products/fungicide groups
  − Monitoring resistance levels in pathogen populations

• Manage fungicides effectively **before** resistance becomes a problem
Thank you for your attention!

Questions?
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731-425-4713