Managing Summer Bunch Rots on Wine Grapes

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What Are Summer Bunch Rots?

Photo: Turner B. Sutton
70+ species of fungi and several bacteria associated with bunch rot worldwide

**Primary pathogens**
- Can invade through natural openings or directly through intact tissue
- Only fungi in the case of bunch rots

**Secondary pathogens**
- Require a wound or injury to invade
- Include fungi, yeasts, and bacteria
Primary Bunch Rot Pathogens

- *Phomopsis viticola*—Phomopsis
- *Guignardia bidwellii*—Black rot
- *Botrytis cinerea*—Botrytis bunch rot
- *Colletotrichum* spp.—Ripe rot
- *Greeneria uvicola*—Bitter rot
- *Botryosphaeria dothidea*—Macrophoma rot
Black Rot—*Guignardia bidwellii*

Photos: Turner B. Sutton
Black Rot—*Guignardia bidwellii*

Photos: Turner B. Sutton
Phomopsis—*Phomopsis viticola*

Photos: Turner B. Sutton
Botrytis Bunch Rot

*Botrytis cinerea*

Photos: Turner B. Sutton
Ripe Rot—*Colletotrichum* spp.

Photos: James W. Travis
Ripe Rot–Red & White Grapes

Photos: James W. Travis
Sporulation on Ripe Fruit

Photos: James W. Travis
Disease Cycle: Ripe Rot

Rot of Ripe Fruit

OVERWINTER
• Mummies
• Infected Pedicels

SPRING
Asexual (conidia) and sexual (ascospores) spores exude from fruiting bodies (acervuli and perithecia)

SECONDARY INFECTIONS
• Birds
• Insects
• Rain/Wind
• Berry to Berry

INFECTION

Cycle

Photos: Turner B. Sutton
Bitter Rot—*Greeneria uvicola*

Photos: Turner B. Sutton
Symptom Development of Bitter Rot

**Disease Rating Scale**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No infection</td>
</tr>
<tr>
<td>1</td>
<td>1 - 5% infection</td>
</tr>
<tr>
<td>2</td>
<td>6 - 15% infection</td>
</tr>
<tr>
<td>3</td>
<td>16 - 50% infection</td>
</tr>
<tr>
<td>4</td>
<td>≥ 51% infection</td>
</tr>
</tbody>
</table>

Photo: Turner B. Sutton
**Disease Cycle:**
**Bitter Rot**

**Rot of ripening fruit**

**OVERWINTER**
- Mummies
- Plant debris
- Canes

**SPRING**
Asexual spores (conidia) exude from fruiting bodies (acervuli)

- Leaf flecking

**SECONDARY INFECTIONS**
- Birds
- Splitting
- Insect
- Berry-to-berry

**INFECTION**
Fungus invades pedicels and remains latent

Photos: Turner B. Sutton
Macrophoma Rot
*Botryosphaeria dothidea*

Photos: Turner B. Sutton

Early symptoms
Disease Cycle: Macrophomina Rot

- Fungus overwinters in infected fruit and stems
- Fruit are thought to be susceptible to infection from bloom to harvest
Secondary Bunch Rot Pathogens

- “Sour rot” complex includes many organisms
  - **Fungi**: *Alternaria*, *Aspergillus*, *Cladosporium*, *Rhizopus*, *Penicillium*
  - Yeasts
  - **Bacteria**: *Acetobacter*

- Favored by wet weather and wounds or injuries to fruit
Sour Rot
Symptoms
– Clusters smell like vinegar
– Juice drips over fruit
– Vinegar flies and larvae present

Photos: Turner B. Sutton
Rhizopus

Aspergillus niger

Photos: Andy Allen, used with permission of Turner B. Sutton
How Sour Rot Pathogens Invade Fruit

- Mechanical injuries or cracks (hail)
- Bird pecks and insect feeding
- Lesions made by other pathogens (powdery mildew)
- Cracks from swelling due to excessive rain

Photo: Turner B. Sutton
Bunch Rot Management

- Plant resistant varieties where possible
- Practice good canopy management
  - Thin, train and hedge shoots, and pull leaves to allow air circulation and sunlight penetration
  - Thin clusters for a balanced fruit load
- Remove fruit mummies, dead rachises, and infected wood from the vineyard during dormant pruning (sanitation)
Bunch Rot Management

- Use effective chemical controls
  - Apply fungicides to protect fruit against primary rot pathogens (Phomopsis, black rot, Botrytis, ripe rot, bitter rot, and macrophoma rot) and powdery mildew, which create lesions
  - Apply insecticides as necessary as part of an IPM program to prevent insect feeding
Bunch Rot Management

- There are no chemical controls for secondary (sour rot) pathogens
  - Prevent wounds and lesions by controlling primary pathogens and insect pests
  - Minimize mechanical injury (e.g., from hedging or leaf pulling)
## Fungicides for Primary Rot Pathogens and Powdery Mildew

<table>
<thead>
<tr>
<th><strong>Timing</strong></th>
<th><strong>Target</strong></th>
<th><strong>Fungicide</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>New shoots (start at ½ -1”)</td>
<td>Black rot (BR), Phomopsis (Ph), PM, DM</td>
<td>Mancozeb plus a PM fungicide</td>
</tr>
<tr>
<td>Pre-bloom to post-bloom</td>
<td>BR, Ph, PM, DM Botrytis</td>
<td>Above program plus: Elevate or Vangard/Scala OR Pristine alone</td>
</tr>
</tbody>
</table>

- **BR**: Black rot
- **Ph**: Phomopsis
- **PM**: Powdery mildew
- **DM**: Downy mildew

**Notes:**
- New shoots: Treatment start at ½ -1 inch of new growth.
- Pre-bloom to post-bloom: Timing includes bloom period.
### Fungicides for Primary Rot Pathogens and Powdery Mildew

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<td>Cover sprays</td>
<td>Ripe rot, bitter rot, &amp; macrophoma rot; PM, DM</td>
<td>Captan or a phosphorous acid, plus a PM fungicide</td>
</tr>
<tr>
<td>Bunch closing, veraison, pre-harvest</td>
<td>Botrytis</td>
<td>Add Elevate or Vangard/Scala</td>
</tr>
</tbody>
</table>
Fungicide Guidelines

- Calibrate the sprayer and use an adequate spray volume for thorough coverage
  - Volume will increase as canopy develops

- Use 7–10 day spray intervals through post-bloom, then 10–14 day intervals
  - Spray before expected rain if approaching the end of the interval
  - For sulfur, use 7-day and 10-day intervals
Fungicide Guidelines

- Be aware of sensitive grape varieties and fungicide interactions to avoid vine injury
  - Do not mix sulfur or captan with oil-based materials or spray them within 14 days of each other
  - Do not use sulfur on Conords, most red-fruited French-American hybrids, and other varieties listed as sulfur-sensitive
  - Do not use Flint (strobilurin) on Conords
Avoiding Fungicide Resistance

- Many fungicides are at risk of resistance development
  - Powdery mildew resistance to strobilurins (Abound, Flint, Sovran, Pristine) has been documented in VA after 15 to 20 total sprays
  - Powdery mildew is becoming insensitive to SIs (sterol-inhibitors: Nova, Elite, Procure, Rubigan) in NY and PA
Avoiding Fungicide Resistance

- Rotate among fungicides from different classes (different modes of action)
- Tank-mix fungicides from different classes that are effective against the same disease
  - Add 2-5 lb. sulfur to a strobilurin or SI spray
  - Use pre-mixes such as Pristine
Avoiding Fungicide Resistance

- Use the right rate of fungicide and spray interval. Consider:
  - Target disease
  - Disease pressure (amount of inoculum)
  - Weather conditions

- Cover vines thoroughly