Using the Midwest Small Fruit and Grape Spray Guide Effectively

Bruce Bordelon
Midwest Small Fruit and Grape Spray Guide

Available in hard copy from UK Media Distribution

Also available on-line at www.hort.purdue.edu/fruitveg/
Midwest Small Fruit Pest Management Handbook

Available in hard copy from Ohio State University Media Distribution (OSU Bull. 861)

Also available on-line at www.hort.purdue.edu/fruitveg/
Plant Pathology 101
The Disease Triangle

Host
Environment
Pathogen

Disease
Disease Triangle

- **Host**
  - Vary in susceptibility genetically, phenologically, etc.

- **Pathogen**
  - Vary in virulence, overwintering inoculum, etc.

- **Environment**
  - Major contributing factor in disease incidence and severity
Downy Mildew defoliation, Illinois 2008
Disease Development

• Environment has a tremendous effect on disease incidence and severity
  – Cool, rainy weather early season=Phomopsis
  – Warm, rainy weather late season=Downy Mildew
  – Cool, dry weather during season=Powdery Mildew

• Host susceptibility is an important factor
Effective Grape Pest Management

• Proper identification of disease or insect
  – Diseases can be similar to each other

• Proper selection of control measures
  – Cultural management to reduce incidence (environment)
  – Chemical applications to *prevent* infection or damage
  – Many chemicals are specific for certain fungi and insects

• Proper application of chemicals
  – Timing (Most important)
  – Rate
  – Coverage (Also very important)
Keys to Disease and Insect Management

• Scouting regularly and thoroughly
  – Symptoms easy to miss from the pickup/tractor
• Knowing what to look for and where
  – Understand environmental conditions conducive to disease, time of insect emergence, etc.
  – Know which cultivars are most susceptible
• Assessing extent of damage (incidence and severity)
• Selecting a control strategy (from the Spray Guide)
• Applying control in a timely manner
Cultural Methods of Disease Management

- All aspects of vineyard management to encourage air flow, rapid drying, sunlight within canopy
  - Appropriate training system and pruning severity
  - Shoot positioning and leaf removal
  - Proper plant nutrition program
  - In-Row weed and row middle management, etc.

- Sanitation
  - Removing mummies, dead spurs, etc.

- Cultivar resistance
  - Cultivars vary significantly in their susceptibility to particular diseases (See Table 4 in the Spray Guide)
Cultivar specific pest management

– Cultivars vary significantly in their susceptibility to particular diseases (Table 4 in Spray Guide)

– Learn to look for specific problems on specific cultivars
  • Problems are easy to overlook
  • Even the most experience growers have problems
Table 4. Relative Disease susceptibility...

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Black rot</th>
<th>Downy mildew</th>
<th>Powdery mildew</th>
<th>Botrytis</th>
<th>Phomopsis</th>
<th>Eutypa</th>
<th>Crown gall</th>
<th>Anthracose</th>
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Relative Disease Susceptibility

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<th>Cultivar</th>
<th>Black rot</th>
<th>Downy mildew</th>
<th>Powdery mildew</th>
<th>Botrytis</th>
<th>Phomopsis</th>
<th>Eutypa</th>
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Differences in downy mildew susceptibility
Keys to Disease Management

- Know your cultivar’s susceptibility
- Be able to recognize and diagnose the common diseases
- Understand the role of the environment
- Selection of the proper fungicide
  - Many fungicides are specific for certain diseases or classes of fungi
Table 1. Effectiveness of Fungicides for Control of Grape Diseases

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Phomopsis cane and leaf spot</th>
<th>Black rot</th>
<th>Downy mildew</th>
<th>Powdery mildew</th>
<th>Botrytis rot</th>
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### Table 1. Effectiveness of Fungicides for Control of Grape Diseases (cont.)

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<th>Fungicide</th>
<th>Phomopsis cane and leaf spot</th>
<th>Black rot</th>
<th>Downy mildew</th>
<th>Powdery mildew</th>
<th>Botrytis rot</th>
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</table>
Fungicide Tank Mix Strategies

• More than one disease is usually present

• Most fungicides control some, but not all diseases
  – DMIs control black rot and powdery mildew only
    • No effect on downy mildew or Phomopsis
  – Mancozeb controls Phomopsis, black rot, downy mildew, but NOT powdery mildew
  – Stobilurins control most, but may not be effective enough against some diseases

• Development of resistance is a major concern with strobies, DMIs
  – Check Table 8 for FRAC info and text for strategies
The “or plus OR” concept

- The spray guide gives tank mix options using a system with the words “or” and “plus”
- “or” is used beneath a material name to denote options of various chemistries which are equally effective
- plus is used between groups of materials to recommend tank mixes
- OR is used to denote yet another option
### Pest/Problem

<table>
<thead>
<tr>
<th>Material</th>
<th>Rate/Acre</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mancozeb 75DF</td>
<td>3 lb</td>
<td>Early sprays for Phomopsis cane and leaf spot are especially critical. Mancozeb and Captan are both very effective for control of Phomopsis. Mancozeb is sold under the trade names Dithane, Manzate, Penancozeb and others. If black rot is a problem in the vineyard, Mancozeb would be the fungicide of choice. Captan is less effective than Mancozeb for black rot control. See Table 1, page 19.</td>
</tr>
</tbody>
</table>

**plus**

| Sulfur or        | See comments. | Use sulfur with caution. See note on sulfur, page 16. |

| JMS Stylet Oil   | 1-2% conc.   | Do not use Captan or sulfur within 2 weeks of applying JMS Stylet Oil, or stylet oil within 2 weeks of a Captan or sulfur application. Mixing Captan or sulfur with oil can result in severe vine damage. |

**OR**

| Bayleton 50WP or | 2-6 oz      | Bayleton is not recommended for control of powdery mildew because of reduced efficacy. It is still effective against black rot. |

| Rally 40WSP or   | 3-5 oz      |
| Rubigan 1EC or   | 3 fl oz    |
| Vintage SC or    | 3-4 fl oz  |
| Procure 50WS or  | 4-8 oz     |
| Elite 45DF or    | 4 oz       |
| Mettle 125ME or  | 3-5 fl oz  |
| Inspire Super or | 16-20 fl oz|
| Endura 70WG or   | 4.5 oz     |
| Quintec 2.08F or | 3-4 fl oz  |

| Potassium salts  | See comments. | See note on potassium salts, page 18. |

**plus**

| Mancozeb 75DF or | 3 lb         | The REI for Captan fungicide ranges from 48 hours to 4 days on various products. Always check the label on the Captan product before you purchase it. |
| Captan 50WP or   | 3 lb         |
| Ziram 76DF       | 3-4 lb       |

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**Example**

Black rot, Phomopsis cane and leaf spot, Powdery mildew, Downy mildew

Bud break to bloom
or, plus
OR
Example (cont’)

Confusing?
(30 fungicides and 52 insecticides for grapes in the spray guide)

We are open to suggestions on how to improve the spray guide to make it easier to understand and more useful for growers. Contact me or your state Extension Specialists.
Spray rate and volume

• Volume: gallons to apply per acre to get thorough coverage
  – dependent on canopy development
• Rate: Amount of pesticide to include
  – Listed on the pesticide label
  – May be a range or fixed amount

• New Resource: “Effective Vineyard Spraying” by Andrew Landers, Cornell University
Dilute versus Low Volume

- **Dilute sprays (old-fashioned high volume)**
  - more water, more refills, more time (200 gpa)
  - may be more pesticide -- runoff
  - may provide thorough coverage*

- **Low volume or concentrate sprays (3x or more)**
  - less water, fewer refills, less time
  - may be less pesticide -- no runoff
  - thorough coverage under most conditions*

*Generally better coverage with low volume sprays applied by air-blast, especially when vines are at full foliage.
Tree Row Volume Spraying

• Method to determine the **dilute** volume needed to get thorough coverage at various plant sizes and densities

• Based on evidence that it takes 1 gallon of water per 1,000 ft$^3$ of plant volume to get thorough coverage
Determining Tree Row Volume

• Step 1: Calculate feet of row per acre
  – 43,560 ft² per acre/ between-row spacing
  – At 10 ft row spacing there is 4,356 ft of row per acre
  – At 9 ft row spacing there is 4,840 ft of row per acre
  – At 12 ft row spacing there is 3,630 ft of row per acre
Determining Tree Row Volume

Step 2: Calculate volume of TRV/acre:

Feet of row/acre x plant height x plant spread = cubic feet of plant volume per acre

Example: Grapes: 10 ft between rows, plants 6 ft tall, 3 ft wide at full canopy

TRV = 4356 x 6 x 3 = 78,408 ft³ per acre
Step 3: Select density factor:

- 1.0 gal/1000 ft$^3$ :: plants very dense, no light visible through canopy
- 0.9 gal/1000 ft$^3$ :: plants dense, little light penetration through canopy
- 0.8 gal/1000 ft$^3$ :: plants moderately dense, adequate light penetration through canopy
- 0.7 gal/1000 ft$^3$ :: plants very open, light visible through entire canopy
Open canopy
Dense canopy
Tree row volume calculation

- Volume equals length x height x width
- Length of row/acre = 43,560/10 = 4,356

Row at 12” shoots
TRV = 4356 x 1 x 1 = 4,356 cu ft

Row at full canopy
TRV = 4356 x 6 x 3 = 78,408 cu ft
Tree row volume calculation

- Volume equals length x height x width
- Length/acre = 43,560/row width
- Density = 1.0

TRV = 4,356 cu ft x 1/1000 = 4.4 gpa

TRV = 78,408 cu ft x 1/1000 = 78 gpa
Determining Coverage
Water sensitive paper or fluorescing dyes
Chemical Rate per Acre

• Based on label
  – Most give specific rate per acre
  – Some give specific rate per 100 gallons

• Based on dilute or concentrate
  – Dilute rate is considered 1X concentration
  – For 3X and greater concentrate, reduce rate by 20-25% (no runoff)
Determining Material Rate per Acre

1. Follow label recommendations
   – especially if given as rate per acre

2. Reduce by 20–25% for 3X and greater concentrates
   — Ex: 2 lbs/acre x 75% = 1.5 lb/acre

3. Use TRV to determine if rate is given per 100 gallons
   Ex: 2 lbs/100 gallons x 78 gallons/acre = 1.6 lbs/acre
Determining Material Rate per Acre

Concentrate spraying using TRV

• Calculate dilute TRV rate
• Ex: TRV = 78 gal/acre, Label rate = 2lb/acre so dilute rate is 2 lb/78 gal
• For 3X concentrate: 2 lb in 78/3 = 26 gallons

CONCENTRATE: same rate in reduced volume means the chemical is more concentrated.
General Guidelines

• Calibrate the sprayer each season and anytime a rate change is desired.
• Adjust rate according to canopy development
• Determine coverage by using water sensitive paper.
• Adjust speed, flow rate, etc. if coverage is not adequate.

Start season at 25-50 gpa
Increase volume as canopy grows to 50-75 gpa then up to 100 gpa if necessary.
Summary

• Know the diseases and insect pests
• Know varietal susceptibility
• Know the fungicides and insecticides
  – Find a reputable dealer (check out the trade show)
• Have a good sprayer and know how to use it
• Keep Records!