Vineyard Spray Program Strategies

Fritz Westover | Viticulturist
Westover Vineyard Advising
What information will be covered

1. Overview of major fungal diseases
2. Review of grapevine phenology (it is important)
3. Tips for rotating spray products
4. Tank mixing strategies (and mistakes)
5. Examples of spray programs for PD tolerant hybrid grapes
Grapevine diseases
Phomopsis infection on first unfolded leaf spreading to shoot and upper leaves.

Phomopsis on unfolding leaves of new shoot. Early infections can lead to fruit rot.
Anthracnose

Lesions tend to congregate around main veins of leaves, unlike phomopsis.

Advanced lesions produce “shot hole” appearance of leaves similar to black rot.
Anthracnose

Lesions can be found on all green tissue, including stems and tendrils.
Anthracnose

Lesions, referred to as “birds eye spot,” on ripening Blanc Du Bois berries.

Birds eye spot on berries before veraison cause cracking and shrivel.
Phomopsis vs. Anthracnose

Phomopsis lesions on leaf are random and have distinct yellow “halo” around margin of lesions.

Anthracnose lesions are found primarily along main leaf veins and have dark gray to black borders.
Black Rot

Lesions appear on leaves, stems, or any green tissue. Small black dots (pycnidia) are fruiting bodies that release spores.

Lesions at advanced stages produce “shot hole” appearance of leaves.
Black Rot

Lesions appear on leaves, stems, or any green tissue. Small black dots (pycnidia) form on all tissues.

Fruit infections start as circular, chocolate milk colored patterns, then whole berries turn brown and shrivel.
Downy Mildew

Severe lesions resulting in necrosis on upper leaf surface.

Severe lesions, spores on underside of leaf.
Downy Mildew

Infection of flower before bloom.

Infection on rachis and berries.
What are the factors that must be understood to create a spray program?

- Understand grapevine growth
- Understand the most critical time for disease and pest control
- Understand prevention of disease
- Understand the types of chemicals available and how they work
- Understand how weather impacts disease pressure
Grapevine Growth

- Vines grow indeterminately
- 10-20 inches of growth per week in spring
Shoot growth rate & spray frequency

- Shoots grow indeterminately
- Early season protectant fungicides cover young shoots
- Shoot growth can continue rapidly
- Newly developed leaves need protection, old leaves expanded
- Developing flowers and rachis need protection (Systemic)
Grapevine phenology
When are grapes most susceptible to disease and insect pests?

Pruning through leaf drop

What is the most critical period for disease control?

2 weeks pre-bloom through 6 weeks post-bloom
Spray Product Rotation
How do we decide which fungicide to use?

Must match product to the fungal disease listed on the label.
Types of fungicides:

- **Protectant (surface)**
  - Coats plant surface
  - Only as good as the spray coverage
  - Plant “outgrows” protection

**Example:** Mancozeb (Dithane) is effectively washed off leaf surface after ~1 inch of rain.
Surface protectant fungicides

- Ziram
- Dithane
- Copper
- Captan
- Quintec
- Sulfur
- Pristine
- ProPhyt
- Oxidate
- Scala
- Ridomil
- Vivando
- Stylet Oil
- Rally
Types of fungicides:

- **Systemic**
  - Coat plant surface & adsorbed into plant
  - Spray coverage is still important
  - Limited movement within vine to provide enhanced protection
  - Require some time to become rainfast
    - About 4 hours or more in general
Systemic fungicides

- Pristine
- ProPhyt
- Ridomil
- Rally
- Vivando
- Topsin M
- Ziram
- Sulfur
- Scala
- Captan
- Stylet Oil
- Oxidate
- Quintec
- Dithane
- Copper
- Dithane
Types of fungicides:

- **Systemic, Post-infection**
  - Works systemically to stop or slow development of early infections
  - Often referred to as “backward” activity
  - Not as effective once spores are visible
Systemic, post infection fungicides
Types of fungicides:

- **Erradicant**
  - Not an ideal situation!
  - Increased risk of resistance development
  - Excellent coverage necessary
  - Must catch disease at first sign
Erradicant fungicides

- Ziram
- Pristine
- Rally
- Stylet Oil
- Scala
- Captan
- ProPhyt
- Ridomil
- Sulfur
- Dithane
- Vivando
- Oxidate
- Quintec
- Copper
Knowing what and when to spray is the first step.

- Resistance management is the next critical component to understand.

**Example:** Do not spray products that are susceptible to resistance (Pristine) on full blown disease outbreaks (Downy Mildew).
Resistance Management

**Multiple Modes of Action**
- Pre-packaged products
  - **Zampro** (2 modes of action for DM)
- Tank mixing products
  - **Dithane** (Ph, BR, DM) + **Rally** (BR, PM) + **ProPhyt** (DM)

![Multiple modes of action](image)
Products with low resistance risk

- Sulfur
- Dithane
- Captan
- Ziram
- Copper
- Stylet Oil
- Oxidate
- Pristine
- ProPhyt
- Scala
- Vivando
- Ridomil
- Rally
- Quintec
Weather impacts

- Weather conditions that impact disease pressure:
  - **Rainfall** – amount and frequency and length of wet period
  - **Humidity** – ambient or in the canopy
  - **Temperature** – high heat may suppress some fungal diseases
Example Spray Programs & Tank Mixes
Important Notes:
Product compatibility and toxicity warnings
Please avoid these costly, crop damaging mistakes!

<table>
<thead>
<tr>
<th>Fungicide Brand</th>
<th>Warnings/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captan</td>
<td>Do not mix with or apply within 14 days of oils (e.g. JMS Stylet Oil).</td>
</tr>
<tr>
<td>Fungi-Phite, Rampart, ProPhyt</td>
<td>Phosphorous acid is toxic to all green tissue if applied at concentration greater than 0.6%. Mix recommended rates with no less than 50 gallons of water. Do not double spray on same day or apply within 7 days of last application. Mixing with copper or certain surfactants or foliar fertilizers may cause crop injury.</td>
</tr>
<tr>
<td>Phosphorous Acid</td>
<td></td>
</tr>
<tr>
<td>JMS Stylet-Oil</td>
<td>Do not mix with or apply within 21 days of sulfur, copper, captan.</td>
</tr>
<tr>
<td>Lime Sulfur</td>
<td>For dormant use only - toxic to leaves.</td>
</tr>
<tr>
<td>Sulfur (Microthiol Disperss)</td>
<td>Do not tank mix oils or oil based surfactants or within 21 days of an oil spray (e.g. JMS Stylet Oil). Do not apply if temperature is 95 F or greater or will be in the next 5 days after application. Do not apply within 45 days of harvest.</td>
</tr>
<tr>
<td>Pristine</td>
<td>Do not apply to Noiret, Norton or Chambourcin.</td>
</tr>
<tr>
<td>Ranman</td>
<td>Do not tank mix with surfactants.</td>
</tr>
<tr>
<td>Switch 62.5WG</td>
<td>Do not apply closer than 21 day intervals.</td>
</tr>
</tbody>
</table>
Putting it all together

Phenology

| 09 | 12 | 15 | 17 |

Type of product

- ProPhyt
- Pristine
- Ridomil

Resistance management

Weather impacts
Pruning Wound Protectants

- Topsin M
- Rally
- Sealants (VitiSeal)
2” to 10” Shoot Length

Manzate/Dithane

ProPhyt (Phos Acid)

Topsin M
2 Weeks Before Bloom

- Manzate/Dithane
- ProPhyt (Phos Acid)
- Ziram
- Zampro
- Rally
- Topsin M
- Revus Top
- Ranman
## Blanc Du Bois Flower Necrosis

**Western Flower Thrips**

**Alternaria**

**Cladosporium**

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Active Ingredient; IRAC</th>
<th>Rate/acre</th>
<th>Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aza-direct</td>
<td>azadirachtin; UN</td>
<td>1-2 pt</td>
<td>++</td>
</tr>
<tr>
<td>PyGanic 1.4EC</td>
<td>pyrethrins; 3A</td>
<td>16-64 fl oz</td>
<td>++</td>
</tr>
<tr>
<td>Danitol 2.4 EC</td>
<td>fenpropadrin; 3A</td>
<td>10.33–21.22 fl oz</td>
<td>++</td>
</tr>
<tr>
<td>Venom</td>
<td>dinotefuran; 4A</td>
<td>1-3 oz</td>
<td>+++</td>
</tr>
<tr>
<td>Assail 30SG</td>
<td>acetamiprid; 4A</td>
<td>2.5 - 5.3 oz</td>
<td>++</td>
</tr>
<tr>
<td>Delegate</td>
<td>spinetoram; 5</td>
<td>3-5 oz</td>
<td>+++</td>
</tr>
<tr>
<td>Entrust 80W (organic)</td>
<td>spinosad; 5</td>
<td>1.25-2.5 oz</td>
<td>+++</td>
</tr>
</tbody>
</table>
Trace Bloom to Fruit Set

- Ziram
- Topsin M
- Zampro
- ProPhyt (Phos Acid)
- Ranman
- Revus Top
- Ridomil Gold Copper
- Manzate/Dithane
- Pristine
- Rally
Pepper Corn to Pea Size Berries

- Revus Top
- ProPhyt (Phos Acid)
- No More Mancozeb PHI + 66d
- Zampro
- Ridomil Gold Copper
- Captan
- Ziram
- Ranman
- Pristine
- Switch
- Oxidate
- Rally
Grape Berry Moth

Common Options

- Intrepid 2F
- Delegate
- Carbaryl
Pre Bunch Closure

- Captan
- Ranman
- Zampro
- Ziram
- Switch
- Oxidate
- Rally
- Ridomil Gold Copper
- Revus Top
- Pristine
- ProPhyt (Phos Acid)
3 weeks pre-harvest

- Captan
- ProPhyt (Phos Acid)
- Oxidate
- Zampro
- Pristine
- Switch
Tips for Improving Spray Efficacy

**Spray Proactively NOT Reactively**

- Spray to prevent disease (spray before the rain)
- Tighten intervals during prolonged wet periods and use systemic materials
- Adjust spray program according to rainfall
  - According to research at Michigan State:
    - 1 inch of rain can remove 50% of protectant fungicide
    - 2 inches of rain can remove most of a protectant fungicide
    - Systemic fungicides are more resistant to wash off
Spraying in the Wind

7 to 10 mph wind
Tips for Improving Spray Efficacy

**Practice Good Canopy Management**

- Canopy management practices that increase airflow and reduce leaf layers have proven to improve spray coverage and light interception of leaves and fruit, both of which can reduce disease incidence and resistance development
  - Shoot positioning and fruit zone leaf removal on rot susceptible varieties
  - Train vines to maximize spray coverage of leaves and fruit
  - Maximize leaf area receiving full sunlight
    - According to research at Cornell University:
      - Direct sunlight exposure significantly reduced powdery mildew severity on clusters and foliage compared to shaded leaves and fruit.
Recommended Resources

Fritz Westover | Viticulturist
Westover Vineyard Advising
Upcoming Webinars

VINEYARD SPRAY PROGRAM STRATEGIES
APRIL 1ST 2019 • 7:00-8:30 PM CST

Learn how to develop a spray program based on local weather conditions, vine growth stages, grapevine variety, and knowledge of how each spray product works, including:

- Selecting spray products
- Critical timing for disease and pest management
- Tips for rotating products (with examples)
- Update on new spray products
- The whys and whos of product tank mixing

MID-SEASON MANAGEMENT STRATEGIES
Date TBA • 7:00-8:30 pm CST

- How to assess your canopy before veraison
- What fertilization if any should be considered mid-season
- Prioritizing pest and disease management
- Vineyard activities to improve fruit ripening and uniformity

Registration coming soon!

PREHARVEST MANAGEMENT PPriorities
DATE TBA • 7:00-8:30 PM CST

Information coming soon!
Hands-On Canopy Management Workshop

April 12th
Driftwood, TX

CANOPY MANAGEMENT
APRIL 12TH 2019 • 1:00-5:00 PM CST
SALT LICK CELLARS • 1800-C FM 1826 • DRIFTWOOD, TX 78619

Followed by wine, refreshments and more Q&A with Fritz.

Learn hands-on canopy management practices that will improve fruit ripening and quality, enhance disease control and establish and maintain permanent vine structure including:

- Shoot thinning and leaf removal strategies
- Managing excessive canopy vigor
- Assessing crop load and balance
- Grapevine tissue sampling demonstration
- Young vine training
- And more...

NON-MEMBER PRICE: $129 • MEMBER PRICE: FREE • MEMBER GUEST PRICE: $65
THE FINEST IN VIRTUAL LEARNING
Everthing you need to GROW your vineyard.

FIELD COURSES
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WEBINARS
Live webinars help you manage your vineyard and get advice during critical times of the growing season.

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Your vineyard questions answered live via bi-monthly real-time online chat with expert viticulturist, Fritz Westover.
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