VIRTUAL VITICULTURE ACADEMY

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

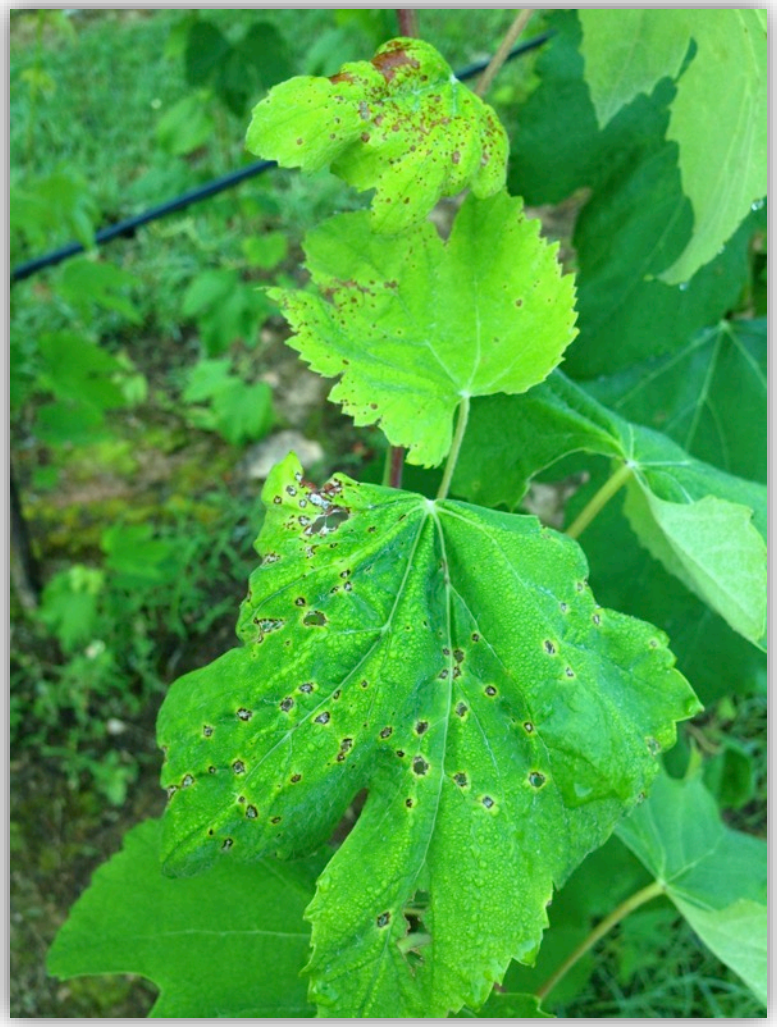
Phomopsis infection on first unfolded leaf spreading to shoot and upper leaves.

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

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

Anthracnose

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



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

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

Anthracnose

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

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

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.

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

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.

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

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.

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

Black Rot

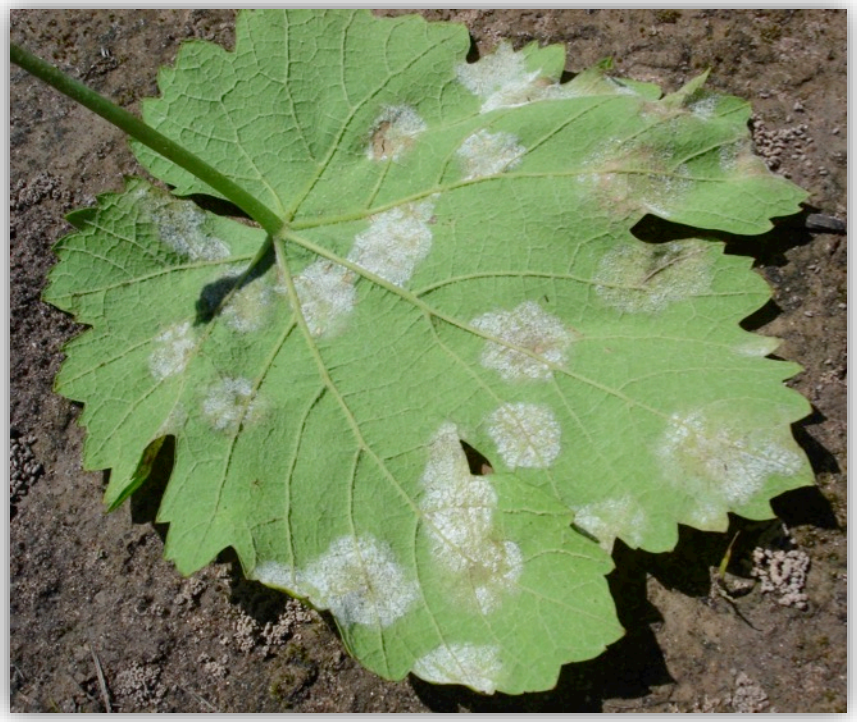
Lesions appear on leaves, stems, or any green tissue. Small black dots (pycnidia) form on all tissues.

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

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

Downy Mildew

Severe lesions resulting in necrosis on upper leaf surface .



Sever lesions, spores on underside of leaf.

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

Downy Mildew

Infection of flower before bloom.

Infection on rachis and berries.

Copyright Westover Vineyard Advising, LLC
fritzwestover@gmail.com

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

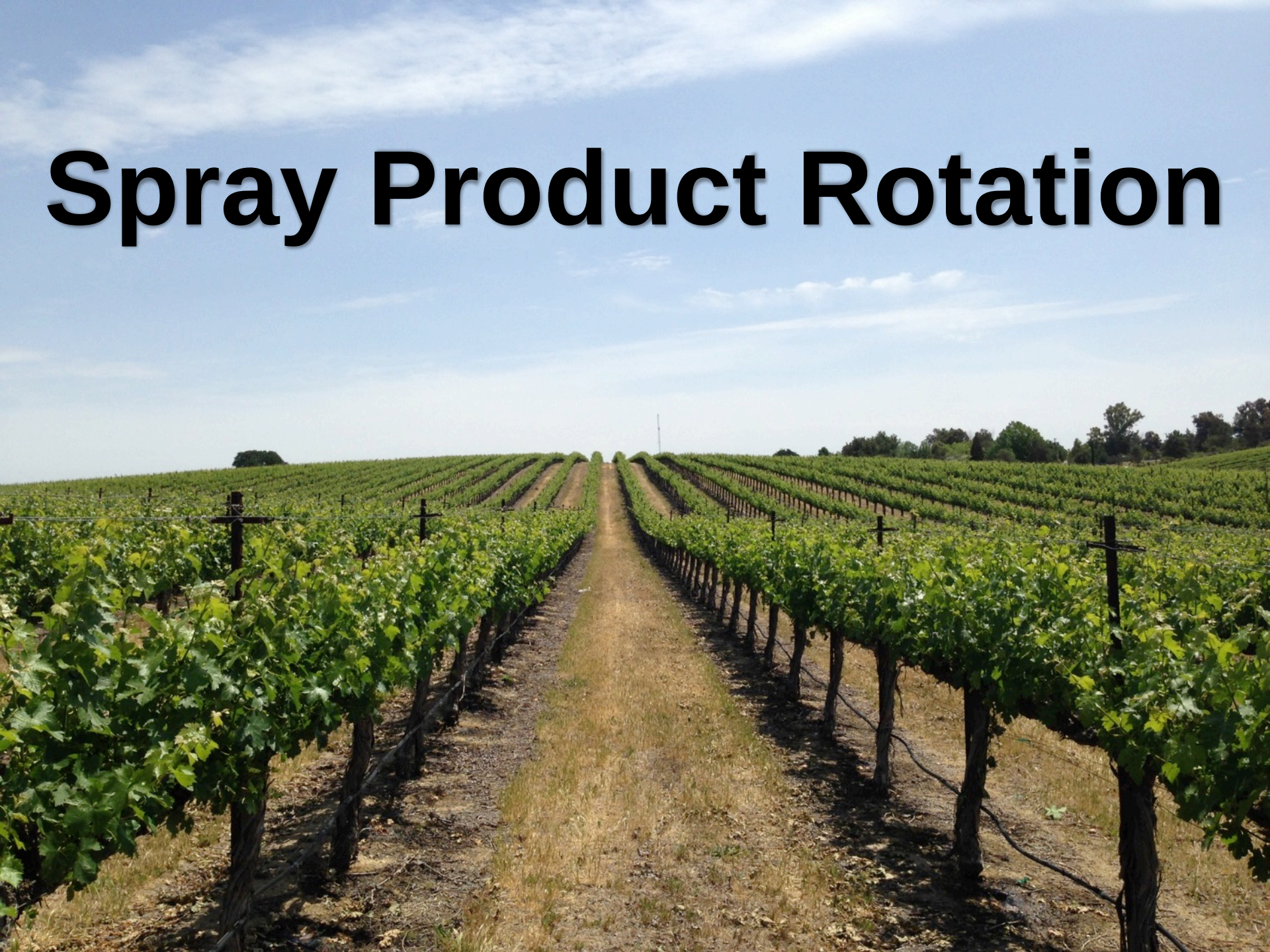
When are grapes most susceptible to disease and insect pests?

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?

Pristine

Copper

Captan

Ziram

Ridomil

Quintec

Vivando

Oxidate

Rally

ProPhyt

Scala

Sulfur

Dithane

Stylet Oil

Copper

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

Stylet Oil

Pristine

Ridomil

Vivando

ProPhyt

Scala

Oxidate

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

Stylet Oil

Oxidate

Quintec

Dithane

Copper

Captan

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

Ridomil

Rally

ProPhyt

Vivando

Ziram

Captan

Stylet Oil

Oxidate

Scala

Pristine

Sulfur

Dithane

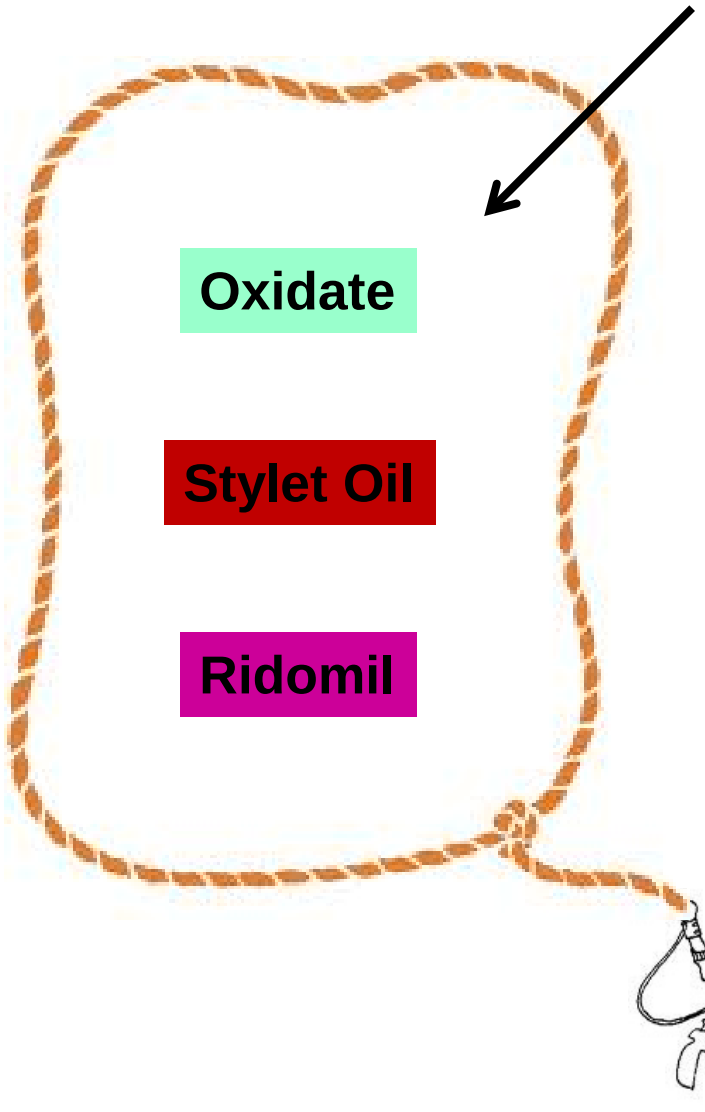
Copper

Quintec

Types of fungicides:

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

Erradicant fungicides



Oxidate

Stylet Oil

Ridomil

Ziram

Scala

Sulfur

Pristine

Captan

Dithane

Quintec

Rally

ProPhyt

Vivando

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

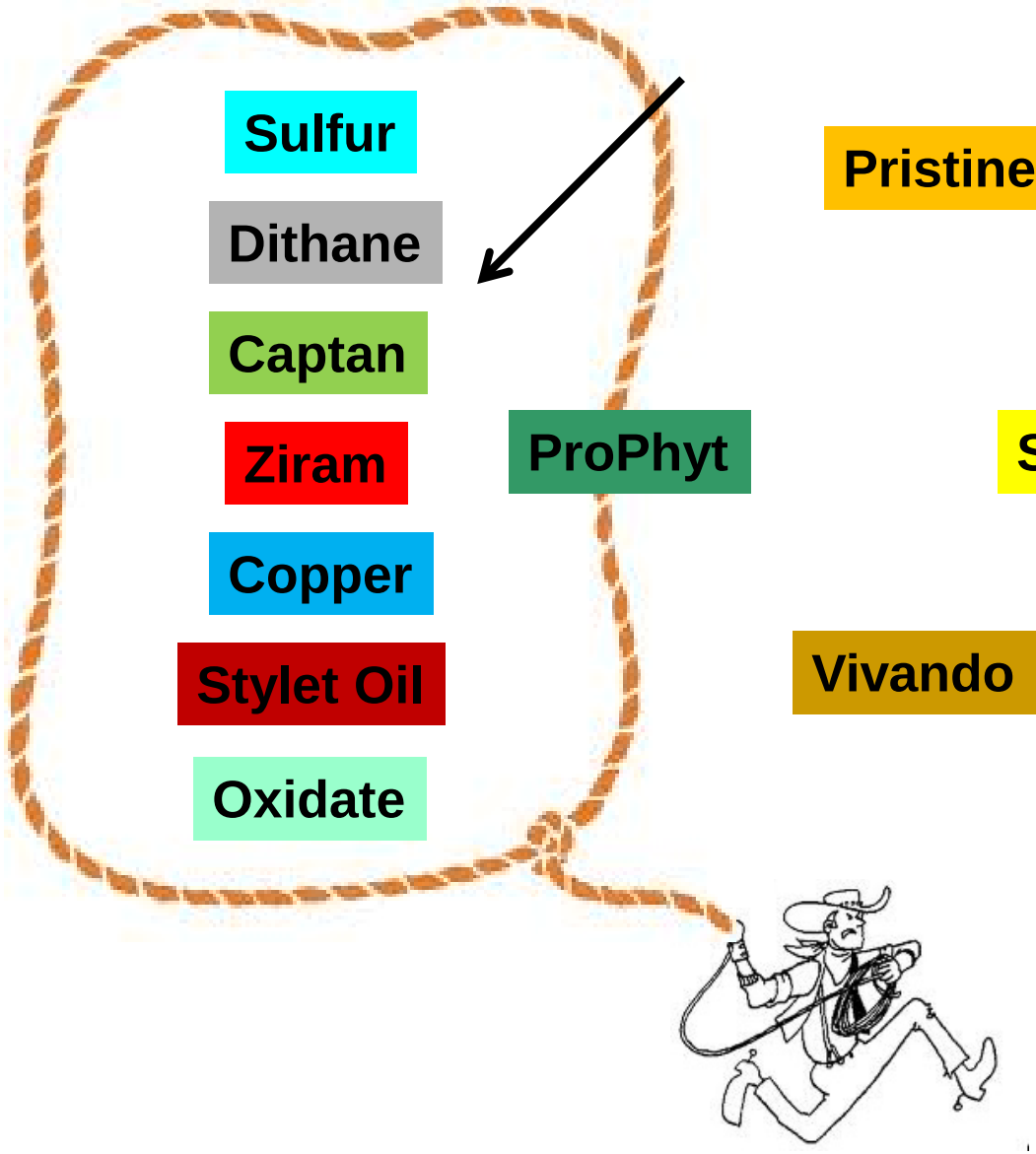
- **Multiple Modes of Action**
  - Pre-packaged products
    - **Zampro** (2 modes of action for DM)
  - Tank mixing products
    - **Dithane** (Ph,BR,DM) + **Rally** (BR,PM) + **ProPhyt** (DM)

Multiple modes of action

Powdery Mildew

Powdery Mildew

Products with low resistance risk



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!

Fungicide Brand	Warnings/Comments
Captan	Do not mix with or apply within 14 days of oils (e.g. JMS Stylet Oil).
Fungi-Phite, Rampart, ProPhyt (Phosphorous Acid)	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.
JMS Stylet-Oil	Do not mix with or apply within 21 days of sulfur, copper, captan.
Lime Sulfur	For dormant use only - toxic to leaves.
Sulfur (Microthiol Disperss)	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.
Pristine	Do not apply to Noiret, Norton or Chambourcin.
Ranman	Do not tank mix with surfactants.
Switch 62.5WG	Do not apply closer than 21 day intervals.

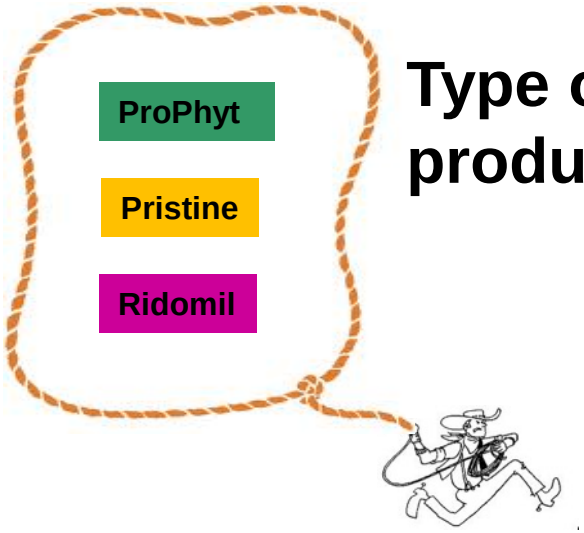
WESTOVER
vineyard advising

Copyright Westover Vineyard Advising, LLC

Putting it all together

Phenology

Type of product



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)

Rally

Zampro

Topsin M

Ranman

Ziram

Revus Top

Blanc Du Bois Flower Necrosis

Western Flower Thrips

Alternaria

Cladosporium

Trade Name	Active Ingredient; IRAC	Rate/acre	Efficacy
Aza-direct	azadirachtin ; UN	1-2 pt	++
PyGanic 1.4EC	pyrethrins; 3A	16-64 fl oz	++
Danitol 2.4 EC	fenpropathrin; 3A	10.33–21.22 fl oz	++
Venom	dinotefuran; 4A	1-3 oz	+++
Assail 30SG	acetamiprid; 4A	2.5 - 5.3 oz	++
Delegate	spinetoram; 5	3-5 oz	+++
Entrust 80W (organic)	spinosad; 5	1.25-2.5 oz	+++

Trace Bloom to Fruit Set

Ziram

Topsin M

Zampro

Captan

ProPhyt
(Phos Acid)

Ranman

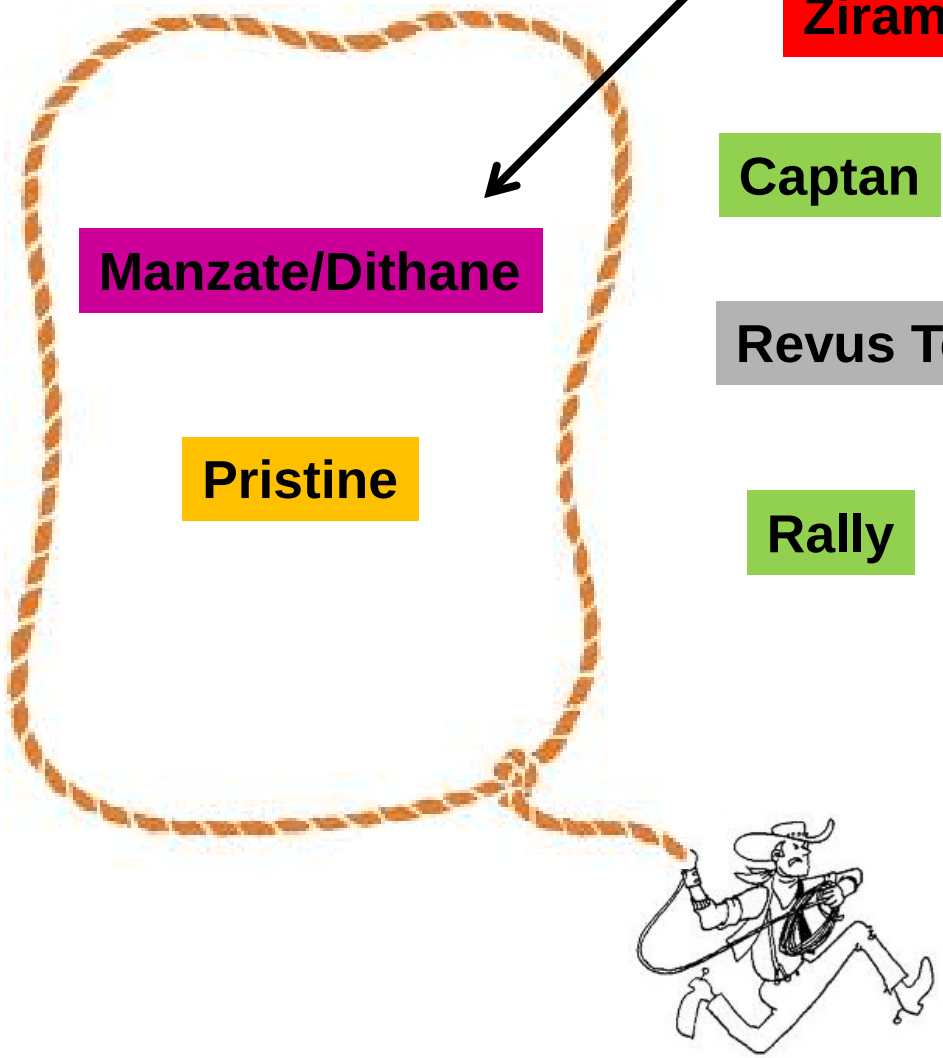
Manzate/Dithane

Revus Top

Ridomil Gold Copper

Pristine

Rally



Pepper Corn to Pea Size Berries

Zampro

Ridomil Gold Copper

Captan

Ziram

Ranman

Revus Top

Pristine

Switch

ProPhyt
(Phos Acid)

Oxidate

Rally

No More Mancozeb
PHI + 66d

Grape Berry Moth

Common Options

Intrepid 2F

Delegate

Carbaryl

Pre Bunch Closure

Zampro

Ridomil Gold Copper

Revus Top

Ziram

ProPhyt (Phos Acid)

Captan

Pristine

Switch

Ranman

Oxidate

Rally

Veraison

Captan

Oxidate

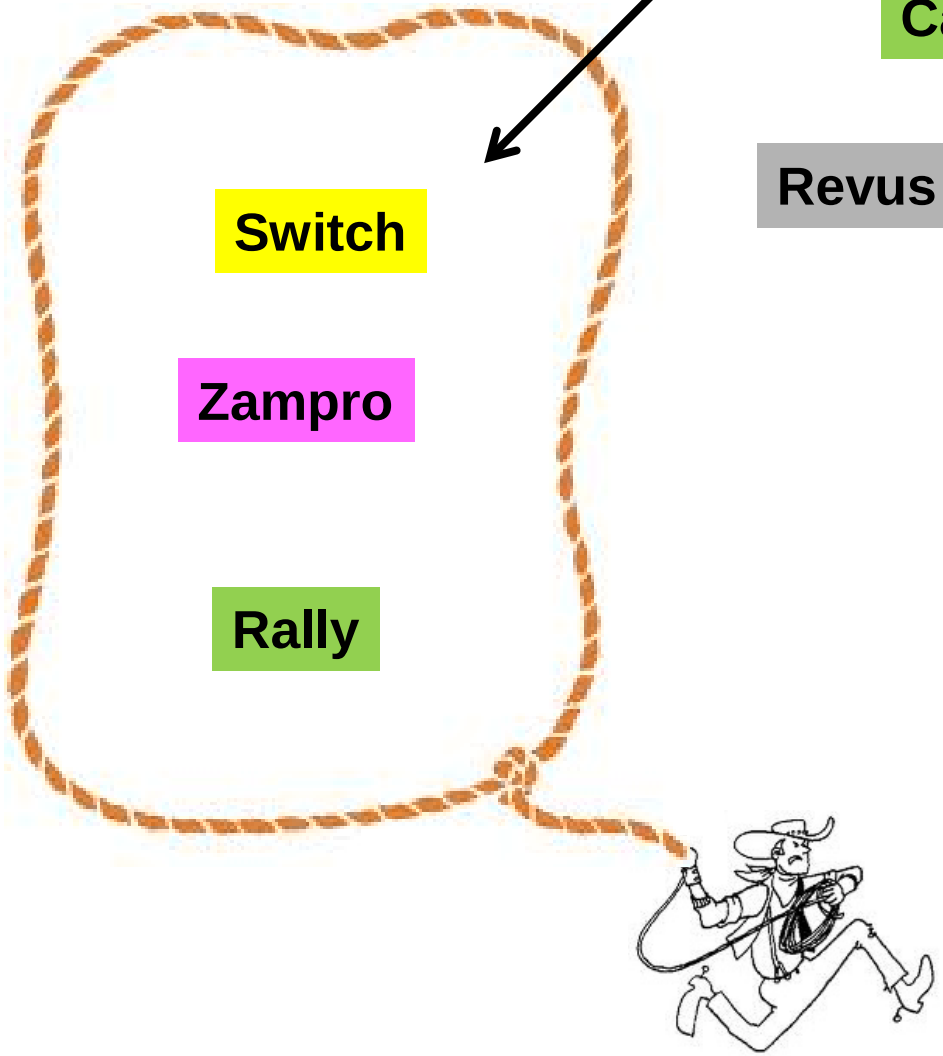
Revus Top

Switch

Pristine

Zampro

Rally



3 weeks pre-harvest

Zampro

Pristine

Captan

Oxidate

Switch

ProPhyt
(Phos Acid)

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.

VIRTUAL VITICULTURE ACADEMY

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 hows and whys 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 PRIORITIES

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

VIRTUAL VITICULTURE ACADEMY

THE FINEST IN VIRTUAL LEARNING

Everthing you need to GROW your vineyard.

FIELD COURSES

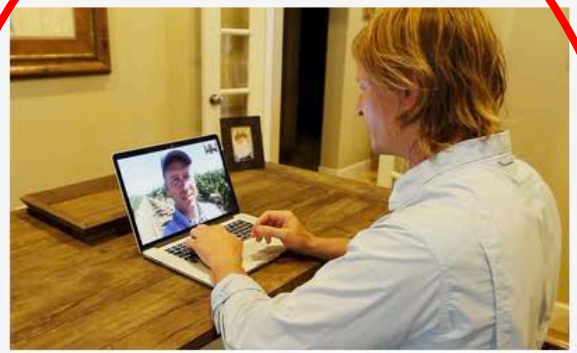
Interactive half-days in a vineyard learning hands-on to improve your vineyard management skills.

Learn More

WEBINARS

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

Learn More



LIVE VINEYARD ADVISING

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

Learn More

VIRTUAL VITICULTURE
ACADEMY

Virtual Viticulture Academy

www.VirtualViticultureAcademy.com

support@VirtualViticultureAcademy.com

Fritz Westover | Viticulturist
Westover Vineyard Advising