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GRAPE POWDERY MILDEW AND CROWN GALL UPDATE

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WHAT WE ARE TALKING ABOUT TODAY
GRAPE POWDERY MILDEW

A Quick Review
**QUICK PATHOGEN REVIEW**

- *Erysiphe necator* is an obligate biotroph
  - Only survives on living tissue
  - If something effects the host, it effects the fungus
- *E. necator* lives almost entirely externally to the plant
BIOLOGY AND TIMING

Ontogenic Resistance

Asynchronous Development

• Ontogenic resistance does not occur in the rachis
  – Late-season rachis infections won’t affect berry development
  – Does make the rachis brittle
  – Fruit-drop during mechanical harvesting
Chasmothecia: The disease kick-starter

The timing of chasmothecia formation influences the timing of release

Practical timing for management:
1. Release after budbreak
2. With 0.1” rain (or heavy fog);
3. and temperature >50°F

Chasmothecia develop rapidly under moderate temperatures

THE GOLDILOCKS PRINCIPLE

- PM doesn’t like it hot or cold
- PM doesn’t like it dry
- PM doesn’t like it sunny

EARLY MANAGEMENT OF LATE SEASON DISEASE

\[ y = y_0 e^{r_E t} \]

- **Primary inoculum vs. Secondary spread**

- **\( Y_0 \) vs. \( r_E \)**
  - Controlling primary inoculum level influences final disease levels, but
  - Role of primary inoculum quickly overshadowed with a favorable development rate

PRE-SEASON ERADICATION VS. IN-SEASON MGMT

• Eradicating mildew before the season starts can help you…if you do nothing else
  – But you always do something else. Nothing beats a good in-season program.
• Spend your money on starting early after a tough season - 3” shoot growth
IN-SEASON TIMING IS MOST IMPORTANT

• The most effective use of management tools is up to and including the critical window

• If you are going to spend money and time, do so there

• Most later-season intervention is reactionary

* In different climates, the true critical window can vary– in this case, as few as 2 synthetic fungicides, just before bloom and at 100% bloom carried most of the control.
GRAPE POWDERY MILDEW

The Update
**PRODUCT STEWARDSHIP – THE NEXT CHALLENGE**

<table>
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<th>QoI Resistant&lt;sup&gt;a&lt;/sup&gt;</th>
<th>DMI Resistant&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Myclobutanil (Rally)</th>
<th>Tebuconazole (Elite)</th>
<th># of Isolates</th>
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<sup>a</sup> Resistant to > 100 µL/mL of azoxystrobin (Abound) or trifloxystrobin (Flint)

<sup>b</sup> Sensitive – no sporulation at 0.5 µg/mL; Moderate – sporulation >0.5 µg/mL; Resistant – sporulation > 3 µg/mL on treated leaf disks

**Graphs:** Moyer et. al., *unpublished*; Table and West Coast Distribution: Mahaffee et al., *unpublished*
THINGS TO THINK ABOUT FOR 2019

• Make sure your sprayers are working
• Start the season off with contact products
  – Understand your effective spray intervals
• Be conscious of repeated over-use of remaining products
  – Consider tank-mixing systemic products with contact products
  – Potential risk of both DMI (FRAC 3) and QoI (FRAC 11) resistance
• Use the environment to your advantage
  – Canopy management
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FRAME NETWORK

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American Vineyard Foundation
Oregon Wine Board
Washington State Wine

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FRAME NETWORK

Fungicide Resistance Assessment Network
Fungicide Resistance Mitigation Extension

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CROWN GALL UPDATE

What it is, and how to manage it.
CROWN GALL – BACTERIUM

**Rhizobium (Agrobacterium) vitis**

- Bacterial disease
- Causes excess host callus development
- Lives asymptptomatically in xylem and phloem
- Symptoms associated with damage (winter, grafting)
- Infected cuttings primary source of introduction

Infection diagrams courtesy of: Dr. Elwin Stewart, Pennsylvania State University
COLD DAMAGE AND CROWN GALL

2009-2010 Season

Merlot

Critical Temperatures (°F)

Tmax & Tmin (°F)

PHL10

XYL10

BUD10

BUD50

BUD90

Oct Nov Dec Jan Feb Mar Apr

http://planthardiness.ars.usda.gov/PHZMWeb/; wine.wsu.edu/extension – Weather Cold Hardiness
CANARY IN A COAL MINE

If it stays warm…

… infected vines remain symptomless
CANARY IN A COAL MINE

If it gets cold…  … symptoms will be seen
CONFUSION, ANGER, BLAME, AND MORE CONFUSION

• “I bought certified plants… and now I have crown gall. Who is going to pay?”

• Certified Vines
  – From a Foundation Source
  – Visually free of crown gall at the time of sale
  – WSDA vs. ODA vs. CDFA Certification

• Does vine source / origin influence risk of gall outbreak (if cold damage risk remains the same)?
THE DECISION IS MADE. NO GOING BACK!

- 55 site surveys thus far (with CG outbreaks)

- In first year:
  - 36 claimed to be planted to certified...
  - Only 4 were actually planted to certified

- Poor understanding of “certified”

- All scouted sites are self-reporting outbreaks
- Largest sample size in Non-certified, smallest in CA certified.
- Still a work-in-progress
CROWN GALL MANAGEMENT TIPS

• Buying certified material is still your best option
  – Don’t intermix certified and non-certified materials in a planting site
  – If you must do both, separate them by rows / blocks

• Crown gall really isn’t a limiting factor if you can get past vineyard establishment phase
  – Don’t plant in cold sites
  – Management for cold damage is also management for crown gall
• Mildew management message:
  – Back to the basics!
  – Consider sprayer, spray operator, and intervals before you consider resistance
  – Use contact products to your advantage
  – Use the environment to your advantage

• Crown gall management message:
  – Know where your vines are coming from
  – Site selection is important
  – Cold damage management is important
QUESTIONS?

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