Grape disease management reminders from bloom through bunch closure

PSU Vineyard Meeting Series

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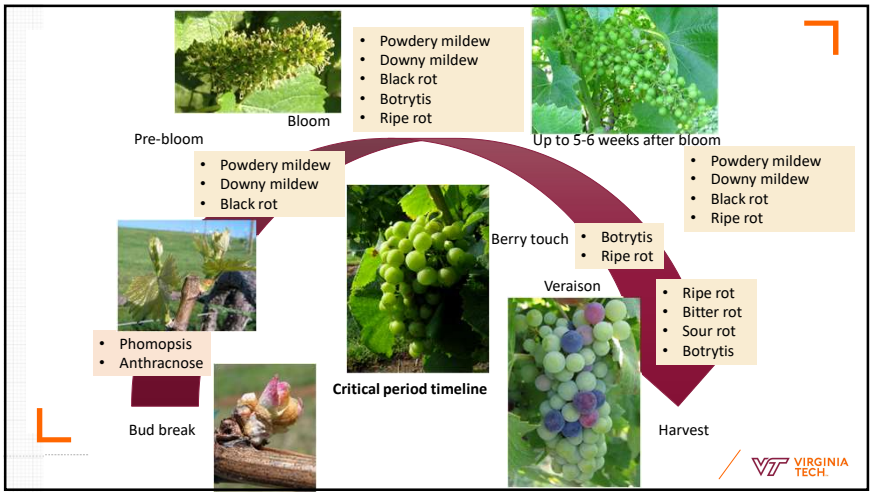

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Downy Mildew

- It can infect leaves and berries, berry infection can cause serious damage
- Heavy leaf infection can cause defoliation

Oily spot appearance on the upper surface

Picture on the center: Organic grape production guide: OSU, Ellis and Nita 2004

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Bottom line for Downy Mildew management

- **Canopy management**
- Pre-bloom: Consider not only infection event, but also warm and humid nights (>65F and >90%) that promote spore production (2013 and 2018!)
- Scouting: Know your vineyard!
  - Downy mildew tends to show up on a certain corner of the vineyard prior to spread to the entire vineyard

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Downy Mildew Management

- Preventative fungicide application
  - Mancozeb, ziram (Dithane, Penncozeb, Gavel, etc. FRAC Group M3), Ranman (Group 21), **Revus/Forum (Group 40 - resistance)**, Zampro (Group **40** + 45), captan (Group M4), copper (Group M1)
- Curative fungicide application
  - Phosphonate (Prophyt, Phostrol, etc. Group P07 (used to be 33)), Ridomil products (Group 4), ~~Presidio (Group 43~~), Tanos (Group 11 + 27) note: we did not find a good result with Tanos in VA), both ~~Presidio~~ and Tanos need a mixing partner
  - QoI fungicides (Flint, Sovran, Abound, etc.) are no longer effective in VA vineyards.

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Questions from the field #1
Not all Phos acids or phosphites are made equal

- For downy mildew control, please use "Fungicide" version of Phosphorous acid, e.g., Prophyt, Phostrol, Rampart, Agri-Fos, etc. These fungicide formulations **do not** get converted into phosphate, which is the primary source of P for plants, but they activate plant's defense mechanism against downy mildew.
- The rate depends on the formulation too!
  - E.g., The percent a.i. of Rampart is lower than others.
  - Based on our trials, Phostrol at high rate (5 pt/100 gal water) caused phytotoxicity on Chardonnay

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Black Rot

- It is a fungal disease caused by *Guignardia bidweillii*.
- The fungus tends to be active in relatively higher temperature ranges, and it takes about 7-8 hours to complete infection = good air circulation helps!!
- It can infect leaves and berries, berry infection can cause serious damage

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Black Rot Management

- Preventative fungicide options
  - Mancozeb, Sterol-inhibitors (Rally, Mettle, Rhyme, Luna Experience, Top Guard EQ, etc., Group 3), Strobilurins (QoI, Pristine, Abound, Flint, Intuity, Group 11), SDHI (Pristine, Luna Experience, Aprovia, Kenja, Miravis Prime, etc. Group 7)
  - **Note: Captan and copper do not work against black rot**
- Curative fungicide options
  - Myclobutanil is known to have a good curative (kick-back) activity against black rot fungus. It has an efficacy up to 6 days after infection.
  - Azoxystrobin does have some curative activity against black rot fungus; however, the efficacy is not as good as that of myclobutanil.

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Powdery Mildew

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Powdery Mildew Management

- Canopy management for
  - Good air circulation
  - Good light penetration
- Timing for chemical management
  - Spring rain promote ascospore discharge: early season protection could be important
- Young berries infected by the powdery mildew pathogen tend to crack open later, thus, early season PM management will be important for Botrytis, sour rot, and fruit fly management too!!

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Powdery Mildew Management
Preventative fungicide options

- Sulfur (Group M2), Fixed copper (Group M1), DMI (Sterol-inhibitor, Rally, Mettle, Rhyme, Top Guard EQ (3+11), etc., Group 3), Quintec (Group 13), Vivando (50 (used to be U8)), SDHI (Pristine, Endura, Luna Experience, Kenja, Aprovia, Miravis Prime, etc. Group 7), Torino (Group U6), etc.
  - DMI: there are evidence of chemical resistance in Europe, AND good evidence of resistance development among VA isolates
  - Torino works, but not as strong as others. Good mixing partner to sulfur to have an extra kick
  - QoI (group 11) most likely not going to be help

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Powdery Mildew Management
"Curative" fungicide options

- Stylet Oil (Group M) [early season, some varieties may show phytotoxicity when applied on premature fruits];
  - **DO NOT mix oil with sulfur or captan!!!**
  - **Cannot spray within two weeks of each other**
- Potassium salt products (Group M)
  - requires through coverage, expensive!

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Questions from the field #2: time to stop sulfur application

- When to stop sulfur application toward the end of the season against powdery mildew?
- It depends on how much powdery mildew you have in your field, but in general, it is better to switch from sulfur to another powdery mildew material 3-4 weeks before harvest due to concern on the effect of sulfur on the wine making.
- I also typically recommend spraying a copper or mancozeb + sulfur AFTER harvest to keep the vine clean, at least once, especially for early harvest cultivars.

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Botrytis Bunch Rot

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Botrytis Management

- Cultivar: i.e., white and compact cluster = more susceptible vs red and loose cultivars = less susceptible
- Good air circulation/Canopy management = very important
  - Long wetness event (> 15 hr) is often associated with disease development
  - Good spray material penetration
- Management of powdery mildew early in the season, and insect management (anything to prevent wounds on berries, which is a trigger for Botrytis symptom development = sporulation)
- Cluster management (excessive leaf removal to promote reduce compactness, e.g., Vinoles)

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Bottom line for Botrytis management Timing of fungicide application

- Pre-bloom: **Powdery mildew** management!
- At bloom: protect flowers with one of Botrytis materials
- Post bloom: the major spray timings are at bunch closure (the last opportunity to deliver fungicides inside of the cluster) and at veraison (spore availability)
- Injury management (***GBM***, Birds, PM)

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Botrytis Management
Preventative fungicide options

- Group 2: iprodione (Rovral/Meteor – resistance = low/mod risk),
- Group 7 (SDHI): boscalid (Endura), Luna Experience, Kenja, Miravis Prime (– resistance = high)
- Group 9: cyprodinil (Vanguard, Inspire super, Switch- resistance = mod)
- Group 12: cyprodinil + fludioxinil (Switch – resistance = mod)
- Group 17: fenhexamid (Elevate – resistance = unknown)
- Group M4: captan – fair activity, but it will be a good mixing partner!
- Group M1: copper (the same comment as above)
- Please rotate among different mode of action (FRAC) groups
- These fungicides were tested for curative activity in the lab. They had some efficacy within 12 hr of infection; however, it is a lab experiment using detached berries (i.e., I wouldn't risk your vines.)

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Ripe rot pathogens cause latent infection

- Although the "rot" may appear late in the season, actual infection can happen much earlier
- After the infection event, the pathogens resides in infected tissue without showing symptoms = latent infection

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Ripe rot chemical management
Timing of application

- Pre-bloom: no special spray for ripe rot
- At bloom: protect flowers with mancozeb or captan
  - MIX with a QoI (Pristine, Flint, Abound), Rovral (iprodione), Switch, tebuconazole, or Aprovia
    - Note: there are known QoI resistance cases of ripe rot pathogens
- Post bloom: Keep using mancozeb until the 66-day PHI, then switch to captan
  - At bunch closure and veraison, MIX with a QoI (Pristine, Flint, Abound), Rovral, Switch, or tebuconazole

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Please tank-mix materials

- Please mix materials with the FRAC code starting with a number (e.g., 11, 3, 19, etc.) with a material with FRAC code starting with M which are:
- Downy mildew and Phomopsis: Mancozeb/Ziram (M3), Captan (M4), or Copper (M1)
- Black rot: Mancozeb or Ziram (M3)
- Powdery mildew: Sulfur (M2) or Copper (M1)
- Botrytis: Captan (M4) or Copper (M1)
- Ripe rot: Captan (M4) or Mancozeb/Ziram (M3)

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Questions from the field #3: When and how long do we need to cover "bloom"?

- It really depends on cultivar and environmental conditions.
  - E.g., cloudy condition can prolong bloom period
  - E.g. 2, Frost damage can create a situation where you will have a series of bloom, one from the primary shoots and the second from the secondary
- If your risk of Botrytis or ripe rot is higher, you may need to spray two applications to cover trace bloom and ~ 50% bloom.

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Questions from the field #4: Botrytis spray for frost-damaged shoots and the timing of bloom application

- Use of captan or copper is probably better than mancozeb because both have some efficacy against Botrytis.
  - Need a black rot material to cover 4-5 weeks after bloom (DMI/QoI, mancozeb, etc.)
- You probably need to have one or two extra spray(s) to make sure your bloom is well covered from trace bloom to the end.
  - E.g., blooms from secondary buds

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Questions from the field #5: spray program for non-bearing vines due to frost damage

- You can rotate among copper, mancozeb plus sulfur, and captan plus sulfur
- You may not able to use mancozeb + sulfur all season long because of the limitation in the amount of mancozeb to be used per year (19.2 lb a.i./A/yr – please refer to the label)
- Make sure to have a material for black rot around bloom. (not for the fruits, but for leaf protection to reduce inoculum for next year)
- You don't need to worry about grape berry moth, but you probably need to think about Japanese beetle.

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Resources

- Blog: grapepathology.blogspot.com
  - My slides will be available
  - You can find links to VCE Pest Management Guides and other guides on the blog
  - Twitter and Facebook (@grapepathology and GrapePathVATech - but please do not use Twitter or Facebook to ask questions)
- GrapeIPM.org
- Email: nita24@vt.edu
- If you email me via SMS (text) or Google hangout, please state your name.

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