



Timely Viticulture

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"Timely Vit" is designed to give those in the Maryland grape industry a timely reminder on procedures or topics they should be considering in the vineyard.

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Downy Mildew Management

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Downy mildew is now a year-long challenge for grape growers in the East. Downy mildew is often difficult to manage because it requires specific weather conditions to become a serious threat, but it can develop into an epidemic very quickly in favorable weather.

Downy Mildew Basics

- The downy mildew (DM) pathogen, *Plasmopara viticola*, is a fungus-like organism (an oomycete) that overwinters in the vineyard as resting spores (oospores) produced from infections in last year's fallen leaves.
- Overwintering infections may become active in the spring as soon as the 2nd or 3rd leaves separated (about 1-inch shoot length).
- Oospores germinate to produce sporangia (fruiting bodies) during wet periods at temperatures of 52° F or higher.
- DM can attack all green parts of the vine, especially the leaves.
- Primary infections occur when sporangia are blown or splashed onto shoots, leaves, or developing clusters. Sporangia release "swimming" spores (zoospores) onto wet tissue. Zoospores migrate to stomata and can cause infection within a few hours.
- Secondary cycles of infection begin when these primary infections produce sporangia, visible as cottony white fibers on the undersides of infected leaves and on clusters. These sporangia may be blown long distances.
- Rapid secondary spread requires warm, humid nights (65–77° F, >95% RH) followed by cloudy weather and frequent showers. Under ideal conditions, each new infection can develop and produce spores in 4 to 5 days. Disease levels can escalate quickly from minimal to devastating.
- Lesions on the upper surface of the leaves are angular, yellowish, sometimes oily, and a white downy fungal growth (sporangia) will appear on the underside and other infected plant parts.
- Vines remain vulnerable to defoliation throughout the season. Premature loss of leaves can jeopardize yield and increase the risk of winter injury.
- Infected parts of young fruit clusters on susceptible cultivars may become discolored or wither and die. If infections occur on the young bunch stalk, the entire inflorescence may die. The clusters become immune to infection within 2-4 weeks after bloom, although all parts of the rachis may remain susceptible 2 months after bloom.

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Managing Downy Mildew

- **Prevention of primary infections is key.** As noted, the pathogen overwinters as oospores inside last year's fallen leaves. Practices that aim to reduce initial inoculum in the spring is therefore beneficial. For example, shredding with a flair mower, burying, or removing leaves during dormant.
- Additionally, application of urea in the fall has been used to aid in breakdown of leaves for tree fruit disease management. The idea behind urea is that it will feed the microbes in the soil to help break down the leaf tissue. Urea should be applied on canopy and the ground at 40 lb./A (dissolve 40 lbs. of feed-grade urea in 100 gallons of water), when 70-80% leaves have fallen. Feed-grade urea is recommended due to its high solubility in water.
- DM epidemics are driven by moisture in the air and soil, and on the vine. Choosing sites with well drained soils and maximizing air circulation and speeding up vine drying through proper shoot positioning and leaf pulling will help to prevent primary DM infections and slow secondary spread if infections do appear.
- Begin protectant fungicide sprays when shoots are 0.5–1 inch long in wet springs (especially after warm, wet winters) and in vineyards where DM was a problem in the previous year. Otherwise, add a protectant no later than the pre-bloom spray.
 - mancozeb, captan, ziram, and copper offer good protection when applied at 7 to 10-day intervals.
 - resistance to FRAC 11 (e.g. Pristine) and FRAC 40 (e.g. Revus) fungicides have been detected to DM pathogen in the region, so minimize the use of these chemical classes of fungicides and do not use them alone for protection.
- **After bloom, scout regularly for DM on leaves, shoots, and clusters.** Infected clusters may fail to set fruit or turn brown, shrivel, and become covered with white, cottony spores. Early leaf symptoms are yellow "oil spots" on the upper sides that soon produce white, cottony spores on the undersides. Late lesions turn brown, and severely infected leaves may drop.
- **If no DM is present in your vineyard,** continue protectant sprays through the 1st cover spray (2nd post-bloom spray) to fully protect fruit, then adjust your cover sprays according to the weather. Berries become immune to direct infection about 2 weeks after bloom but may be infected via the rachis for about 2 more weeks.
 - Captan, ziram, copper, carboxylic acid amides (CAAs; Revus, Zampro, Forum), Quinone inside inhibitors (Qils; Ranman), and phosphites (e.g. Phostrol, ProPhyt) are options after you reach the seasonal limit or 66-day PHI for mancozeb.
 - CAAs, Qils, or Phosphites should be rotated with other materials for resistance management.
- **If you see symptoms of DM,** apply a fungicide with post-infection and anti-sporulant activity as well as protective activity **as soon as possible.**
 - Ridomil Gold is available only as a premix with mancozeb (66-day PHI) or copper (42-day PHI). It is very effective on serious outbreaks but highly resistance prone—and expensive. Make no more than (preferably 1) application per season, and rotate to another DM fungicide between applications.
 - Phosphites (0-day PHI) offer good post-infection and anti-sporulant activity, especially on "oil spot" lesions that are not yet sporulating.

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