

Powdery Mildew – *Uncinula necator*

Powdery mildew is one of the most important grape diseases worldwide. In Minnesota, it is a significant disease of grapes, however, it is less economically important than downy mildew. Uncontrolled, powdery mildew reduces vine growth and yield, and can also effect fruit quality and winter hardiness. *Vitis vinifera* and some hybrids (especially those derived from *V. amurensis*) tend to be more susceptible than American varieties.

Symptoms

If powdery mildew is left untreated on the berry it can destroy infected clusters. Foliar infections can reduce photosynthesis causing reduced Brix levels and vine growth.

Vegetative



On leaves, powdery mildew appears as white or grayish-white patches on the upper surface. These patches can expand until the entire upper surface of the leaf is coated. Uninfected cells, next to infection sites, may become necrotic. Occasionally, these spots resemble the “oil spot” symptom of downy mildew. Heavily infected leaves may dry out and prematurely drop. When young leaves are infected they will become distorted and stunted as they expand.

Young, infected shoots develop dark brown lesions that remain as brown patches on the dormant stems. Petioles and cluster stems are also susceptible to infection. If infected they become brittle and break during the growing season.

Fruit

Blossom clusters can become infected causing flowers to wither and drop without setting fruit. Cluster infections occurring shortly after bloom may result in poor fruit set and crop loss. Actual berry infection causes the highest level of economic loss. Affected berries may show small spots, similar to the leaves, or may be covered by the white, powdery growth. If the epidermis of fruit is infected before it attains full size it will not grow properly.

If a berry is severely infected, powdery mildew kills the epidermal cells while the pulp continues to expand. The internal pressure causes the berry to split. This splitting opens up the fruit to secondary bunch rot infections. Infected red and purple varieties will fail to color and have a blotchy appearance. Some berries will develop a netlike pattern of scar tissue over the surface and may produce off-flavors in wine. Berries are susceptible to infections until they reach 8% Brix content, from bloom through a few weeks after bloom.

Disease Cycle

Uncinula necator, the cause of Powdery Mildew, overwinters in Minnesota as cleistothecia, fruiting bodies, in bark crevices on the grape vine. In the spring cleistothecia discharge

ascospores, airborne spores, when they receive an average of 0.10 inch of rain and an air temperature of 50°F. The ascospores are discharged within 4-8 hours of the rainfall and are carried by wind to any green surface of the growing vine.

The first infections are often observed as individual colonies growing on leaves closest to the bark. The pathogen develops another type of spore, conidium within 6-8 days, if the temperature is between 43-90°F (6-32°C). The optimal range for development is 68-81°F (20-27°C) and temperatures above 95°F (35°C) have been reported to inhibit or kill colonies. High relative humidity, 40%-100%, rather than free rain, is conducive to the production of this pathogen. These conidia and fungal mycelia are what give the powdery appearance to infected tissue and cause further spread of the pathogen.

Control Strategies

Proper site selection is imperative in controlling powdery mildew. Start with a site where vines are exposed to sun all day since this pathogen thrives in low, diffuse light. Choosing resistant varieties, such as Frontenac and Frontenac gris, is also important in reducing the impact of powdery mildew. The most efficient way to control powdery mildew is the use of good cultural practices. Utilize pruning and training systems to improve air circulation which promotes rapid leaf drying. This will help reduce the high relative humidity the pathogen needs to infect the plant. Shoot positioning and summer pruning will also help with full spray coverage and canopy penetration.

Clear crop debris from the ground after leaf drop or incorporate it into the soil at the beginning of the season. This will reduce any overwintering inoculum in the vineyard. Proper weed control and good soil drainage will reduce the relative humidity which increases the spread of the pathogen.

Implementing a properly timed spray program, starting early in the season, is essential for managing powdery mildew in the vineyard. Monitor and spray susceptible varieties, particularly *vinifera* varieties, regularly. Look for white powdery spots on the upper surface of the leaves and powdery fungal growths on the berry or discoloration during ripening. Powdery mildew can be controlled by proper timing and effective fungicides. For the most current spray recommendations refer to the Ohio State University Extension web site, <http://ohioline.osu.edu/b861/>.

There are a variety of sprays allowed under organic regulation. Many organic growers utilize sulfur products to control powdery mildew starting at budbreak. They need to be applied every seven days or reapplied whenever they are washed off by rain or irrigation, which may not be cost effective in Minnesota. There are various oils, biofungicides and soaps used to control powdery mildew. Make sure to verify each registered pesticide is permitted within the organic certification program.

References

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