CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Dr. Francis J. Ferrandino
Department of Plant Pathology and Ecology
The Connecticut Agricultural Experiment Station
123 Huntington Street, P. O. Box 1106
New Haven, CT 06504

Phone: (203) 974-8504
Fax: (203) 974-8502
Email: Francis.Ferrandino@ct.gov
Website: www.ct.gov/caes

Founded in 1875
Putting science to work for society

Grape Downy Mildew

Pathogen: ***Plasmopara viticola***

Grape downy mildew is a major problem on grapevines grown in Connecticut. The pathogen can infect all green tissue of the plant including leaves, young stems, flowers and young developing berries. The pathogen is a water mold and not a true fungus.

Symptoms. The initial symptom starts as yellowing water-soaked lesions on the upper side of leaves Figure 1).

Figure 1. Downy mildew lesions on top of leaves.

After 5-10 days "downy" patches appear on the underside of these leaves under conditions of high relative humidity (Figure 2).

Figure 2. Underside of infected leaves are "downy".

Disease Development. The downy patch on the underside of infected leaves is composed of sporangiophores, which are special multiply branched tree-like mycelium. The pathogen forms a sporangium, a lemon shaped spore, at the tip of each branch of the sporangiosphores (Figure 3). These spores are deposited on uninfected grape tissue via wind and/or rain-splash the spores. Each sporangia can release as many as 4 motile spores called zoospores, which can swim in

a thin film of water using whip-like appendages (flagella).

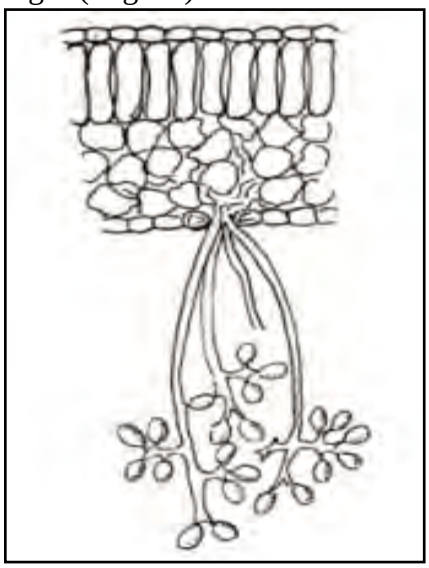

Figure 3. Sporangiophore emerging from bottom of infected grape leaf.

Zoospores then germinate, penetrate plant tissue through open stomata and grow interstitially between the cells of the host. As the pathogen reaches the underside of leaves a new "downy" layer of sporangiophores are produced and the cycle repeats. The infection cycle can be completed in 5 days under the favorable condition with high relative humidity and temperatures between 68-77 °F. The process takes longer at higher or lower temperature and can take as long as 17 days at 55 °F. Serious defoliation can occur if the weather conditions are favorable for infection. The pathogen overwinters as oospores, which are sexual spores produced within leaf tissues. As the vine senesces, infected leaves dry and fall to the ground. In spring, the oospores can germinate and produce a single sporangium, which can be blown or splashed to new grape tissue to start the disease cycle anew.

Disease Management.

Cultivar Selection

Cultivars of the European grape (*Vitis vinifera*) and hybrids bred from this old world stock are particularly susceptible to downy mildew. American grapes (*V. labrusca* and *V. riparia*) are less prone to injury, however, there are no totally resistant cultivars.

Sanitation and Canopy Management

Any practice that improves the health and vigor of the grapevine will reduce the impact of disease. This includes fertilization, removal of dead wood and appropriate weed control. Proper canopy management by cane training and leaf thinning encourages proper air flow and reduces humidity. This practice also allows sprays to penetrate the plant canopy and better protect susceptible tissue. Since the fungus overwinters in fallen leaves, removal of plant debris from the vineyard in the fall reduces primary inoculum.

Fungicide Application

Fungicide sprays should be applied when the weather conditions are favorable for infection.

Fungicides

1. Mancozeb
2. Captan
3. Copper
4. Metalaxyl
5. Strobilurin

The first three fungicides are preventative and are most when applied prior to infection. The last two chemicals are systemic and highly effective post-infection as a curative application. However, populations of the fungus can become resistant to one or the other fungicide, so an alternating spray scheme is recommended.

CAREFULLY READ THE LABEL ON EACH PESTICIDE BEFORE USE !!!