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## **DISEASE CONTROL FOR HOME GRAPE PLANTINGS**

There are a number of diseases that occur year after year in both commercial and backyard plantings of grape. The diseases commonly found on grape in Connecticut are black rot, powdery mildew, and downy mildew. The occurrence of these diseases often depends upon the weather and the developmental stage or phenology of the grape host, beginning at dormancy and continuing until the berries are harvested. As a consequence, a season-long program for disease management is often necessary in order to harvest a high percentage of useable fruit. Weather conditions greatly influence both the occurrence and severity of plant diseases. Consequently, diseases are generally most difficult to control in years of prevailing high temperature, high humidity, and abundant rainfall and cloud-cover.

### ***I. CONTROL STRATEGIES:***

Grape diseases can be effectively managed through the combined use of culture, sanitation, resistance, and fungicide sprays. This integrated approach to disease control minimizes the reliance upon one type of control over the others and usually results in a high percentage of quality berries.

#### **A. CULTURE-**

Cultural methods include maintaining plant vigor by proper planting, fertilizing, and pruning and by following general practices that help to minimize stress.

#### **B. SANITATION-**

Sanitation involves pruning and removing affected or dead portions of the vine and removing diseased foliage or berries which are often important sources of inoculum for the next season.

#### **C. RESISTANCE-**

Resistance involves selection and planting of species or cultivars with genetic resistance to specific diseases. This effectively reduces or eliminates occurrence of the disease in question.

#### **D. FUNGICIDE SPRAYS-**

Proper selection, timing, and application of these sprays are important. Thorough coverage of all parts of the vine is necessary and sprays should be applied until run-off. The fungicide label will contain information on plant hosts and diseases, dosage rates, days to harvest interval, and safety precautions.

## **II. COMMON DISEASES:**

### **A. BLACK ROT-**

Black rot, caused by the fungus *Guignardia bidwellii*, is probably the most serious disease of grapes in Connecticut. This fungus can infect all green parts of the vine including leaves, tendrils, new shoots, as well as berries. However, mature leaves and ripe fruit are not susceptible. Infections of leaves first appear as red spots on the upper leaf surface in late spring. These circular spots enlarge and become tan to light brown with distinct, dark borders. Small, pinpoint black fruiting structures of the fungus often develop in the centers of these spots. Most serious damage usually occurs on the berries. On the fruit, infections first appear as whitish spots which enlarge to sunken areas with dark borders. Significant infections usually occur when the grape is pea-size or larger. As infection progresses, the fruit become black, wrinkled, mummified, and look like raisins. Infected grapes often shatter, leaving only the stem.

The fungus overwinters on mummified berries on the soil or in old clusters still hanging in the vines. Spores of the fungus are released during spring rains. Air currents and rainwater carry them to newly developing tissues where infection occurs. Secondary infections can occur when additional spores are produced on the newly infected tissues. These secondary spores can be produced into August and are predominately spread by splashing rain.

Sanitation is **essential** to control black rot. Infected mummies on the vine or infected twigs or shoots should be removed, pruned, or destroyed. In addition, all mummies on the soil should be disked or buried. These steps eliminate significant amounts of overwintering inoculum of the fungus. In conjunction with sanitation, a season-long fungicide program is usually necessary for effective black rot control, especially if infection was severe the previous year. Properly selected and timed fungicide sprays should be made to protect blossoms, foliage, and fruit throughout the growing season (refer to spray guide on page 5).

### **B. POWDERY MILDEW-**

Powdery mildew, caused by the fungus *Uncinula necator*, can infect all green tissues of the grapevine. Tissues are generally susceptible to infection throughout the growing season. This disease is often confused with downy mildew which is discussed in the next section. Diseased leaves appear whitish gray, dusty, or have a powdery white appearance. Petioles, cluster stems, and green shoots often look distorted or stunted. Berries can be infected until their sugar content reaches about 8%. If infected when young, the epidermis of the berry can split and the berries dry up or rot. When older berries are infected, a netlike pattern often develops on the surface of the berry.

The powdery mildew fungus overwinters in dormant buds or as specialized structures on the surface of the vines. When conditions are favorable for growth of the fungus in spring, spores are produced, released, and cause new infections. Secondary spread of the disease can occur if spores are produced in these new infections. It is important to note that moisture is **not** necessary for infection so this disease can be serious during relatively dry years.

Control of powdery mildew is generally based on the use of properly selected and timed fungicide sprays (refer to spray guide on page 5). In addition, cultural practices may reduce the severity of the disease and can increase the effectiveness of chemical controls. Any methods that contribute to increased air circulation (e.g. row orientation, pruning and training practices, site selection) are important. *Vitis* species also differ in their susceptibility to this disease: *V. vinifera* is highly susceptible whereas *V. cinerea*, *V. labrusca*, and *V. riparia* are much less susceptible.

### **C. DOWNY MILDEW-**

Downy mildew, caused by the fungus *Plasmopara viticola*, is often a problem during warm, wet years in Connecticut. The fungus is an obligate pathogen which can attack all green parts of the vine. Symptoms of this disease are frequently confused with those of powdery mildew. Infected leaves develop pale yellow-green lesions which gradually turn brown. Severely infected leaves often drop prematurely. Infected petioles, tendrils, and shoots often curl, develop a shepherd's crook, and eventually turn brown and die. Young berries are highly susceptible to infection and are often covered with white fruiting structures of the fungus. Infected older berries of white cultivars may turn dull gray-green, whereas those of black cultivars turn pinkish red.

The fungus overwinters mainly in the fallen leaves. In spring, the fungus produces two types of structures when conditions are favorable. Motile spores called zoospores are released from these structures and dispersed by splashing rain. Since water is necessary for zoospores to swim and infect, outbreaks of disease often coincide with periods of wet weather. The most serious outbreaks have been found to occur when a wet winter is followed by a wet spring and a warm summer with intermittent rains.

A multifaceted approach is necessary to control downy mildew. Sanitary practices such as pruning of infected shoots and raking and removing fallen leaves helps to reduce overwintering inoculum. Cultural practices which promote and encourage good air drainage are also important. In addition, cultivars vary in susceptibility: *V. vinifera* are highly susceptible, *V. aestivalis* and *V. labrusca* are less susceptible, and *V. cordifolia*, *V. rupestris*, and *V. rotundifolia* are relatively resistant. However, in years of favorable conditions for disease, chemical controls are inevitable (refer to spray guide on page 5).

## **III. SPRAY GUIDE:**

### **A. PESTICIDES-**

A **general purpose fruit spray**, available under a variety of trade names, is effective for control of many of the common diseases and insect pests of grape. This mixture usually contains captan as the fungicide component and methoxychlor and malathion or carbaryl as the insecticide component. Captan gives poor control of powdery mildew and black rot but will give good control of downy mildew.

Alternative fungicides for control of specific diseases can be used to supplement or can substitute for the general purpose mix. However, the availability of some of these compounds may be limited. It is important to check the "days to harvest interval" on all fungicide labels **before** use. These include:

1. **ferbam**- for control of black rot;
2. **fenarimol**- very good for control of powdery mildew, some control of black rot;
3. **mancozeb**- for control of downy mildew and black rot;
4. **metalaxyl**- very good for control of downy mildew;
5. **myclobutanil**- very good for control of black rot, good control of powdery mildew;
6. **potassium bicarbonate**- some control of powdery mildew;
7. **wettable sulfur**- for control of powdery mildew; can be phytotoxic on some cultivars;
8. **ziram**- some control of black rot and downy mildew;

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

## **B. SPRAY SCHEDULE-**

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<b><u>GROWTH STAGE</u></b> <sup>1</sup>	<b><u>DISEASE</u></b>	<b><u>MATERIALS</u></b>
<b>1- INCH SHOOT GROWTH-</b> 1" of new growth	Powdery mildew	General purpose mix or alternative fungicide for powdery mildew control
<b>3-5 INCH SHOOT GROWTH-</b> 3-5" of new growth	Black rot, powdery mildew, downy mildew	Same as above or alternative for specific disease of concern
<b>10-12 INCH SHOOT GROWTH-</b> 10-12" of new growth	Black rot, powdery mildew, downy mildew	Same as above
<b>PRE-BLOOM-</b> just before blossoms open	Black rot, powdery mildew, downy mildew	Same as above
<b>POST-BLOOM-</b> when 90% of blossoms have opened	Black rot, powdery mildew, downy mildew	Same as above
<b>SECOND POST-BLOOM-</b> 10-14 days after post bloom spray	Black rot, powdery mildew, downy mildew	Same as above
<b>SUMMER COVER SPRAYS-</b> every 7-14 days until harvest, as necessary; Refer to "days to interval" on fungicide label.	Black rot, powdery mildew, downy mildew	Same as above

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<sup>1</sup> Refer to page 6 for a pictorial representation of grape growth stages

**C. GRAPE GROWTH STAGES-**