Disease Management in Home Grape Plantings

DEPARTMENT OF PLANT PATHOLOGY

Introduction

There is probably nothing more frustrating for a home gardener than to see the fruits of his or her labors lost to diseases and other pests. Diseases occur when environmental conditions are suitable for pathogens to attack the host plant. Some pathogens attack a wide variety of plants, whereas others attack only specific plants. Additionally, some pathogens can attack all plant parts, whereas others attack only selected tissues (i.e. flowers, fruit, roots etc.).

Many types of organisms cause infectious diseases of plants, but the five major groups of plant pathogens are the fungi, water molds, bacteria, viruses and nematodes. Adverse environmental conditions also can cause disease-like symptoms on plants; referred to as disorders. These include improper soil pH, nutrient deficiencies and toxicities, soil compaction, excess water, herbicide damage and more. Plants weakened by adverse conditions may be further predisposed to attack by pathogens.

Successful disease management begins with accurate identification of the cause of the problem. Knowing the common diseases of individual crops aids greatly in disease identification and management. Many diseases are readily identified based on characteristic signs (observation of the pathogen itself) and symptoms (observation of damage to the plant) of disease. The identification of other diseases requires microscopic examination of diseased tissues or even more sophisticated laboratory techniques, which are available through the C. Wayne Ellett Plant & Pest Diagnostic Clinic, Columbus OH.

Disease Management

Prevention is the key to the management of diseases in the home garden. There are several disease management options for the home grape grower that have minimal impact on the growing environment yet help to maintain a healthy crop. Creating an optimal growing environment for grapes will minimize plant stress, which in turn will reduce plant disease susceptibility and ultimately improve crop yield and the aesthetics of the planting. Several synthetic chemicals and natural products (also called biopesticides) are available to aid in the management of plant diseases, but they should always be used in conjunction with cultural practices intended to modify the environment to make it less conducive to disease development.

Site Selection and Preparation. Choose a sunny, well-drained location with a slight elevation to plant grapes. Most frost free-sites are areas that are 5-10% higher than the surrounding areas in your yard. Grapes require 8 hours or more of full sun and do not like to have "wet feet". Plant vines 6-8 feet apart to allow for optimal root development and adequate airflow in the planting. Healthy soil is the foundation for healthy and productive plants. Soil temperature, moisture, pH and fertility all influence a soil pathogens ability to survive and colonize plants. The best soils for grapes allow for deep and spreading root growth, contain 3-5% organic matter and have a pH between 6.0-6.8. Have your soil tested annually to determine the pH, salts, nutrients and organic matter levels, and water holding capacity. Contact your local Extension Office for a listing of soil testing labs in your area.

Cultivar Selection. When considering what cultivar to plant, vine winter hardiness and resistance or tolerance to diseases should be considered. Cold damage weakens vines and makes them more susceptible to diseases and insect pests. There are many cold-hardy wine grape cultivars available for backyard growers in Northern climates. The Midwest Grape Production Guide (Bulletin 919) published by The Ohio State University provides a detailed list of cultivars suitable for Ohio's climate. Resistance or tolerance to the most common diseases of grapes is not available in most commercial cultivars. However, every effort should be made to buy available cultivars with some disease resistance.

Virus-tested vines. There are several grape diseases caused by viruses. When possible, always buy virus-tested vines and always purchase vines from a reputable source such as The Clean Grapevine Program (CGP) at Missouri State University. The CGP sells seven grape grape cultivars suitable for Northern climates that are certified to be free of nine major grape vine viruses. Vines confirmed to be infected with a virus should be promptly removed from the vineyard.

Pruning. Diseases flourish in high humidity. Good air circulation between vines and within a vine's canopy is very important for preventing most diseases. Vines should be

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pruned annually to keep the canopy from getting too dense. The method of pruning and the amount of pruning will depend on the type of training system and cultivar.

Sanitation. Sanitation includes various physical practices intended to reduce pathogen populations and prevent their spread. Many pathogens survive year round in or on the vines and and/or fruit debris. The removal of diseased fruit from the vine when it is first observed is encouraged. If the number of diseased leaves is minimal, especially early in the season when fruit are not yet formed, they should also be removed. Removing too many leaves once the fruit have formed can result in sunburned berries. Cleaning up the vineyard in the fall is also important. Leaves, pruning debris, and fallen fruit should be raked and removed from the planting. Any remaining fruit on the ground should be buried. Do not compost plant residue from diseased vines. Diseased tendrils and canes should be pruned and removed during the dormant season.

Synthetic chemicals. The home gardener has several chemical control products to choose. Most of the available products for home gardeners work on contact and must be applied before the disease occurs or as soon as disease symptoms are observed. The most common fungicidal products for home garden use contain sulfur, copper or mancozeb. Organic gardeners can use sulfur or copper to manage grape diseases. Some varieties of grape are sensitive to copper and/or sulfur, which can cause foliar injury. A list of synthetic chemicals available for homeowners is provided in Table 1. Before applying a fungicide always read the product label carefully.

Biopesticides. Many home gardeners prefer to use organic products that are more "environmentally or earth friendly" than traditional synthetic chemicals. Biopesticides are derived from natural materials, such as plants, animals, minerals, and fungi or bacteria, are most effective when used in conjunction with cultural methods. A list of biopesticides available for homeowners is provided in Table 2.

Sulfur Sensitive Grape Varieties: Chambourcin, Chancellor, Concord, De Chaunac, Ives, Maréchal Foch, Rougeon

Copper Sensitive Grape Varieties: Aurore, Chancellor, Elvira, Merlot, Rosette, Rougeon

Common Diseases of Home Grape Plantings in Ohio

Powdery mildew. The fungus that causes powdery mildew can infect all parts of the grapevine. Signs of infection appear as white powdery spots or patches on the leaves and/or fruit. If grapes are infected when they are small, the skin stops growing but the pulp continues to expand and the berries split. Diseased purple or red berries fail to color properly and have a blotchy appearance at harvest. Disease is best controlled by planting tolerant or resistant cultivars. Vines and fruit can be protected with synthetic chemicals or biopesticides when applied from early bloom through 3 to 4 weeks after bloom.

Downy mildew. The fungal-like pathogen that causes downy mildew can infect all actively growing parts of the vine. The disease is most severe during seasons that are excessively wet and warm. Initial infections appear as light yellow spots on the leaves. As the leaves age, the spots turn brown and become crusty. Young infected berries turn brown, are soft, and shatter easily. Under humid conditions,

Table 1. Fungicides for Use in Home Grape Plantings

Fungicide	Trade Names	Disease(s) Controlled	Recommended Label Rate (Per Gallon of Water)
captan	Hi-Yield Captan 50W Fungicide	Downy mildew	1-2 tablespoons
copper	Liqui-Cop Copper Fungicidal spray	Anthracnose Downy mildew Powdery mildew	1 teaspoon
copper soap	Natural Guard Copper Soap Fungicide	Downy mildew Powdery mildew Botrytis bunch rot	1-4 tablespoons
mancozeb	Bonide Mancozeb Flowable with Zinc	Black rot Downy mildew	5 teaspoons
myclobutanil	Spectracide Immunox Multi-purpose Fungicide	Anthracnose Black rot Powdery mildew	2 tablespoons
potassium salts plus sulfur	Safer 3-in-1 Garden Spray Concentrate	Powdery mildew	8 tablespoons
sulfur	Bonide Sulfur Plant Fungicide Sulfur Safer Brand Garden Fungicide II	Powdery mildew	1-4 tablespoons

the berries will be covered with downy white spores that resemble powdered sugar. All European cultivars (*Vinifera vitis*) are susceptible to downy mildew. Susceptibility within North American cultivars (*Vitis labrusca*) ranges from highly susceptible to resistant. Vines and fruit can be protected with synthetic chemicals when applied from early bloom through 3 to 4 weeks after bloom.

Powdery Mildew
Julie Beale, University of Kentucky, Bugwood.org

Downy Mildew
Melanie Lewis Ivey, The Ohio State University

***Black rot*.** Black rot is the nemesis of backyard growers and if not managed properly can result in complete crop loss. All cultivated grape varieties are susceptible to black rot. Symptoms first appear on the leaves as brownish red irregular shaped spots with tiny black dots in the center. Fruit symptoms don't usually begin to appear until the grape berries are pea size or larger. Brown spots form on the fruit and then the fruit start to shrivel and turn black. Eventually the berries will shrivel into hard raisin-like structures called mummies. Mummies should be removed from the vine and destroyed. Fruit can be protected with synthetic chemicals when applied from early bloom through 3 to 4 weeks after bloom.

Sour rot. Sour rot is a condition characterized by the rapid rotting of ripening berries. Berries affected by sour rot exude a vinegar-like odor. Several types of bacteria are associated with this disease. Infected berries of white varieties turn light chestnut brown, whereas infected berries of red varieties turn brick or purplish red. Sour rot typically develops in berries injured by other fungal pathogens, insects, birds or hail. The best way to manage sour rot is to minimize injury to the berries. Bird decoys or netting can be used to deter birds. Traps are effective at controlling insect pests. Fungicides will not effectively manage sour rot.

Anthracnose. Anthracnose is a fungal disease that affects all succulent parts of the plant, but lesions on shoots and berries are most commonly observed. Lesions on the shoots are sunken with dark reddish-brown to black edges. On berries, small, sunken reddish circular spots form. These spots have a white center and often resemble a bird's eye. Cultivars differ in their susceptibility. European and French hybrids are more susceptible than American cultivars such as Concord or Niagara. Unless anthracnose has consistently been a problem in the vineyard, fungicides are generally not needed for anthracnose control. Pruning of diseased shoots, shoots and cluster stems during the dormant season is the most effective way for backyard growers to control anthracnose.

Botrytis bunch rot. Botrytis bunch rot, also called grey mold is caused by a fungus that grows on dying or dead plant tissue. The fungus causes blight of leaves, shoots and blossom clusters. Before grapes begin to ripen, the fungus moves to the berries where it grows and produces masses of greyish brown spores in the berries. Botrytis bunch rot can occur anytime during the growing season, but fruit are most likely to be damaged near harvest. Bird damage, hail damage, and other fungal infections can encourage infections by the fungus. Similar to sour rot, minimizing injury to the berries will help to prevent Botrytis bunch rot. Fungicides applied at bloom, bunch closing, veraison, and just prior to harvest are effective at controlling Botrytis bunch rot.

Black Rot
Melanie Lewis Ivey, The Ohio State University

Sour Rot
Yvonne Woodworth, The Ohio State University

Anthracnose
Clemson University - USDA Cooperative Extension Slide Series, Bugwood.org

Botrytis Bunch Rot
University of Georgia Plant Pathology, University of Georgia, Bugwood.org

Table 2. Biopesticides for Use in Home Grape Plantings

Biopesticide	Diseases Controlled	Recommended Label Rate (Per Gallon of Water)
Bayer Advanced Serenade Garden Disease Control	Powdery mildew	4-8 tablespoons
GreenCure Foliar Fungicide	Powdery mildew	1 tablespoons
SafeGro Mildew Cure	Powdery mildew	3 tablespoons
Neem Oils (many brands)	Powdery mildew	Refer to product labels as rates vary depending on the brand.
BioWorks MilStop	Powdery mildew	1 tablespoons
BioSafe Disease Control	Powdery mildew	1.5 Tablespoons

Common Injuries of Home Grape Plantings in Ohio

Ozone injury. Ozone injury occurs on grapes when ozone levels increase in the atmosphere during electrical storms or when smog levels are high. Symptoms are most predominant on older leaves and only appear on the upper side of the leaves. Small brownish bronze spots form between the veins, often in a uniform pattern. Cultivars vary in their sensitivity to ozone, but when ozone levels are high all varieties can be affected. There is no treatment for ozone damage. Ozone damage doesn't generally impact fruit yield or flavor.

Herbicide injury. Grapes are particularly sensitive to herbicide injury and certain herbicides can injure or kill the vines, reduce yields and contaminate the fruit. Herbicides (i.e. 2,4-D and Dicamba) used in corn and soybean production can drift onto grapes and cause severe leaf distortion, vine stunting and/or shoot tip death. Damage is most severe when exposure occurs early in the season (April-May) during the early stages of shoot growth. Although glyphosate (i.e. Round-up) can injure grapes the damage is less severe than injury from 2,4-D and Dicamba. Caution should be used when applying glyphosate near grapevines. Avoid applying glyphosate during the summer and fall or when shoots begin to trail. Always use a shield mounted to the spray wand and avoid spraying during windy conditions.

Ozone Injury
Melanie Lewis Ivey, The Ohio State University

Glyphosate Injury
Melanie Lewis Ivey, The Ohio State University

Dicamba Injury
Doug Doohan, The Ohio State University

2,4D Injury
Andrew Muza, Penn State Extension

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