Fruit Diseases in Your Garden or Landscape

MASTER GARDENER PROGRAM

DECEMBER 2022

Plant Diseases

- Result of a constant irritation of plant tissue by a pathogen
- Disrupt the normal functions of a plant
- Reduce yield or quality of plant and plant products

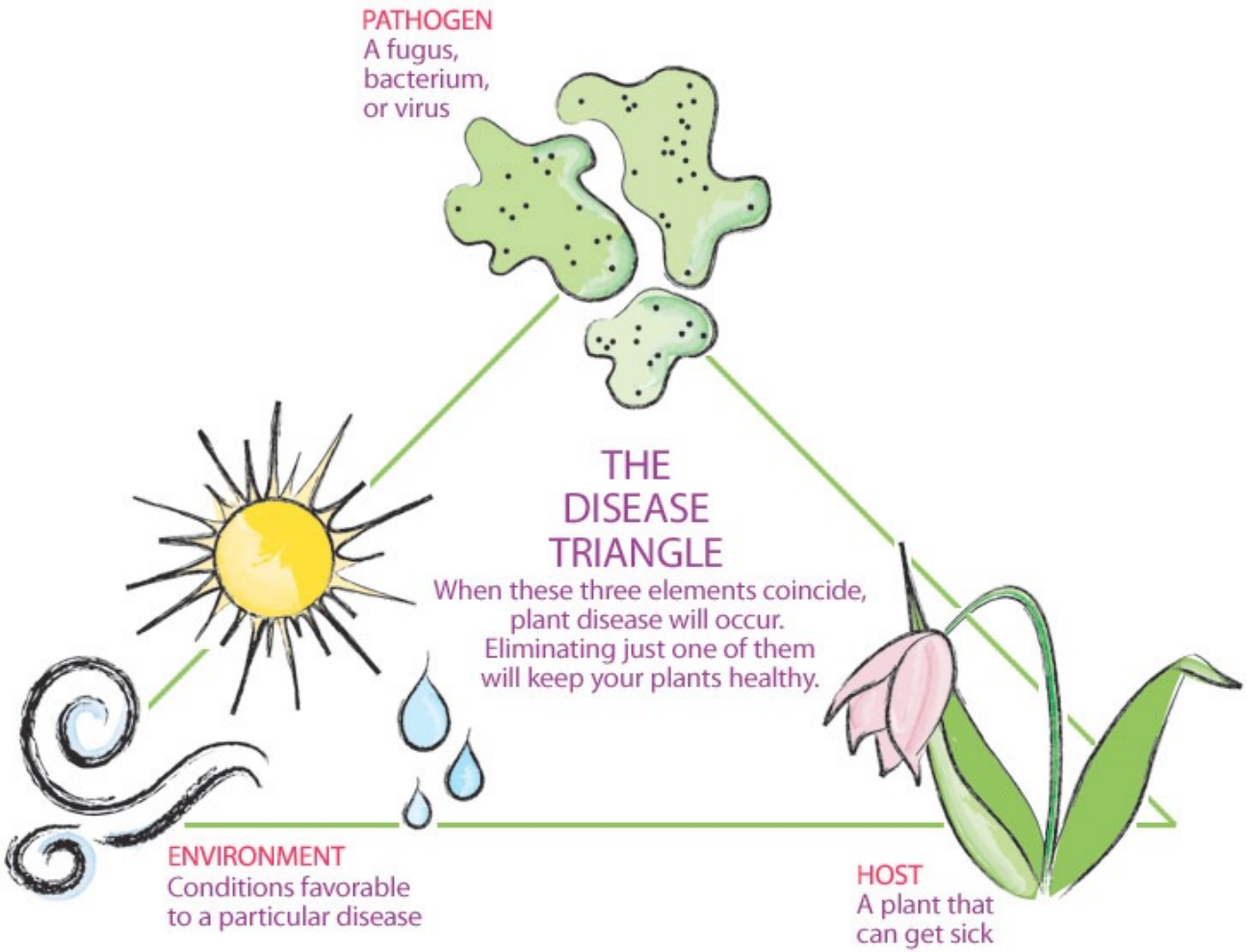
Plant Diseases

- Two types of diseases
  - Abiotic = non-infectious agent = DISORDER
  - Biotic = infectious agent

Downy Mildew Disease

Herbicide Injury

Conditions Required for Disease



Successful Disease Management

- Successful management requires:
  - Accurate diagnosis
  - Accurate timing of management tactics (year-round approach)
  - An integrated approach
    - Cultural, host resistance, biological, chemical control

Anthracnose on grape is best managed during delayed dormancy (prior to bud break)

Fire blight is best managed during bloom

Black knot of plum is best managed before the knots turn black

Integrated Pest Management for Home Gardens

Things to think about **prior** to planting:

- Site selection
  - full sun and good soil drainage
  - site history
- Select top quality, healthy nursery stock
- Inspect new plants prior to planting
- Select resistant varieties

Integrated Pest Management for Home Gardens

Things to think about **after** planting:

- Maintaining a healthy planting (i.e., nutrition, winter protection)
- Cultural practices that support good air circulation and soil drainage
- Preventative fungicides or biopesticides

Hilling of grapes to prevent winter injury

Diagnosing Diseases of Fruit Crops

Know the crop!

- What is normal healthy?
- What is the genetic background of the crop?

Honeycrisp leaves = NORMAL

Grape leaves = NORMAL

Diagnosing Diseases of Fruit Crops

Look around!

- Look for patterns or “hot spots” in the field
- Look in the canopy
- Identify nearby crops

- Identify potential risk factors:
  - Low lying areas
  - Weed or insect infestations
  - Nearby cull piles
  - Large trees

Diagnosing Diseases of Fruit Crops

Be prepared to look deeper!

- Look for symptoms and signs above and below the soil line

Essential Tools of the Trade

Recommended Tools of the Trade

OSU Plant and Pest Diagnostic Clinic

Now in Wooster

- Program Director – Dr. Francesca Rotondo
- Information available on website
  - ppdc.osu.edu
  - 330-263-3721
- Physical and Digital Samples
  - $20+/sample

OSU-Wooster, Selby Hall, 1680 Madison Avenue, Wooster, OH 44691

Apples

Cedar Apple Rust

Gymnosprangium juniper-virginianae

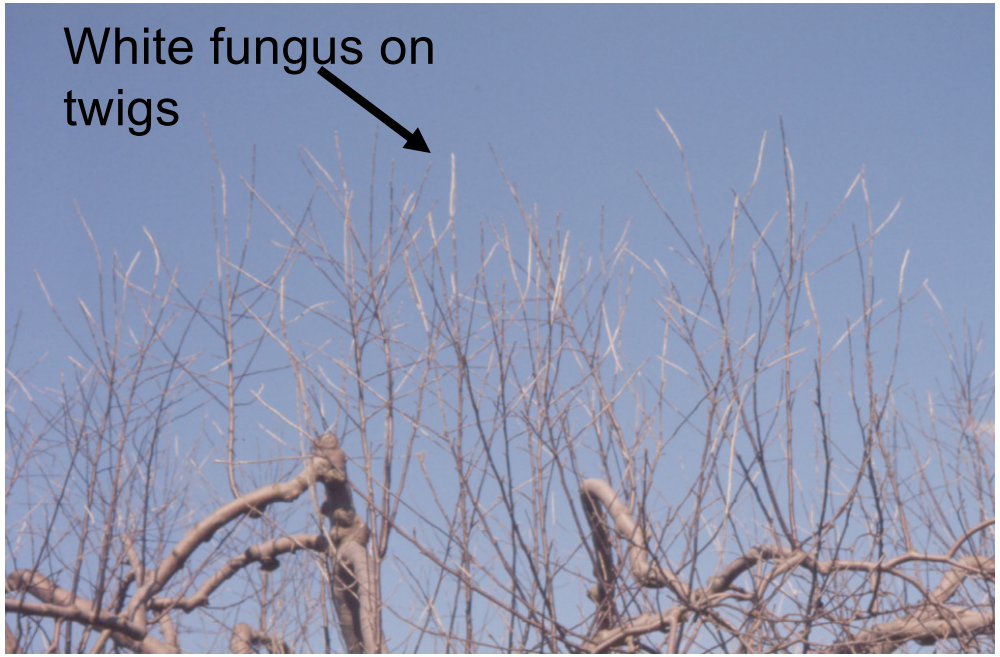
Apple Scab

Venturia inaequalis

- Apple and crabapple

Powdery Mildew

Podosphaera leucotricha



Apple and Pear

Fire Blight (*Erwinia amylovora*)

Disease Resistance: Apple Cultivars

Cultivar	Apple Rust	Fire Blight	Scab
Cortland	S	S	S
Liberty	R	R	R
Ever Crisp	?	?	?
Fujii	R	S	S
Gala	R	S	S
Honey Crisp	S	*MR*	MR
Baldwin	R	S	S
Crimson Crisp	S	R	R

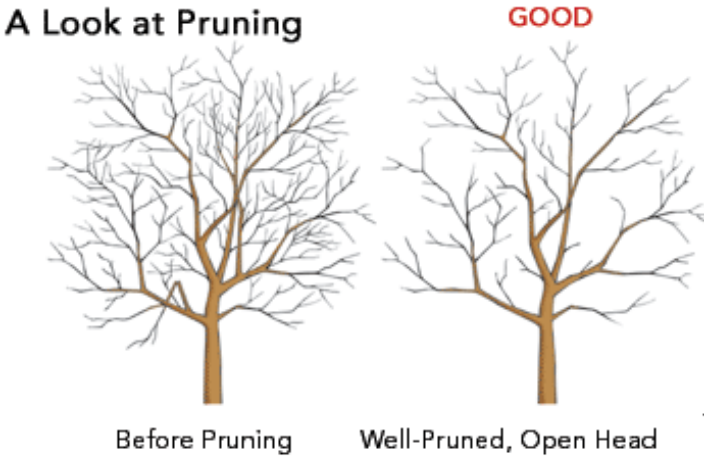
Fire Blight Resistance is Variable and Often Unreliable

Cultivar	Fire Blight
Cortland	S
Liberty	R
Ever Crisp	?
Fujii	S
Gala	S
Honey Crisp	MS
Baldwin	S
Crimson Crisp	R

Home Garden Cultural Practices for Managing Apple Fungal Diseases

- Site location with ~6 hr full sun exposure

- Crop debris removal
  - within canopy
  - around base of tree
- Pruning to increase air flow
- Removal of other host plants



Apple Bud Stages

Silver tip

Pink tip

Apple Bud Stages

Green tip

Pink bud

Home Garden Fungicides for Managing Apple Fungal Diseases

Product	Rate (Tbsp per gal)	Timing (1st application)	Incompatibles
Captan 50WP	2	Green tip	Oils Lime
Immunox	1	Green tip (scab) Pink bud (PM)	
Sulfur	5	Pink bud	Oils

Fire Blight Management for Apples and Pears in the Home Garden

- Copper sprays-*canker phase*
  - Dormant to pre-green tip
- Insecticides-*Shoot blight phase*
  - Leaf hoppers, plant bugs, psylla
- Pruning
  - During dormant period
  - Tool sterilization when accompanied by healthy pruning

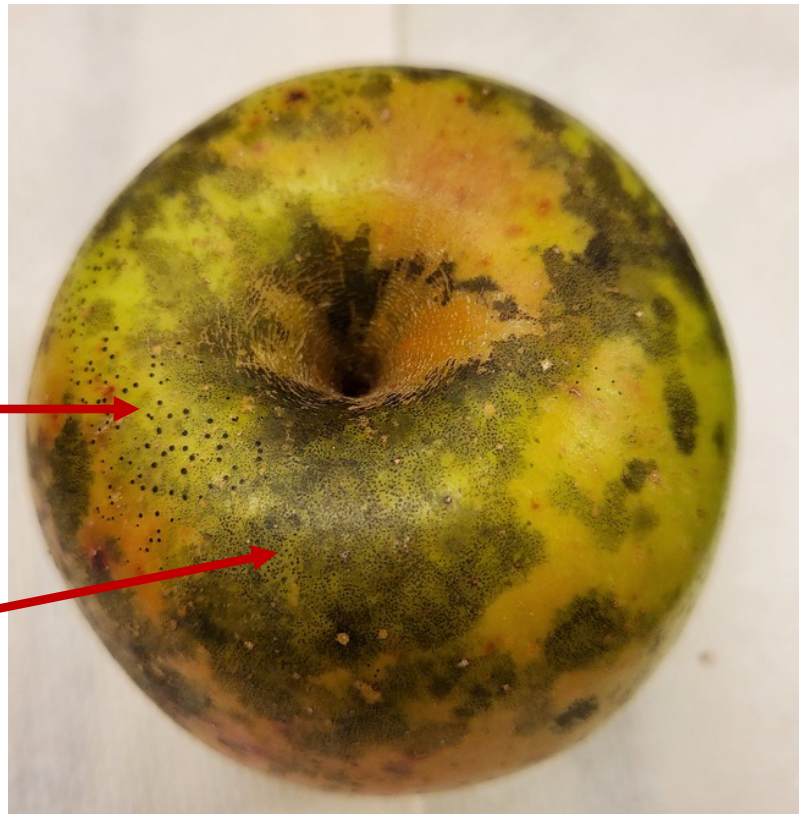
Bitter Rot of Apple

Colletotrichum sp.

Sooty Blotch and Fly Speck

Fungal disease complex

- Superficial, can be rubbed off
- Golden varieties very susceptible



Bitter Pit

Physiological Disorder – Calcium deficiency main cause

- Dark, slightly depressed spots
- Break down of tissue under the skin

Soggy Breakdown

Physiological Disorder – internal chilling injury

- Honeycrisp very susceptible to chilling injury

Stone Fruit

Leaf Curl of Peaches and Nectarines

Taphrina deformans

- Control
  - One well timed application dormant application
  - Apply in autumn after 90% leaf drop **OR** before buds swell in the spring
  - Chlorothalonil (Daconil)
    - 2.25 tsp/gal

Black Knot

Apiosporina morbosa

- Plum and Prune
- Cherry
- Apricot/peach/necatrine
- Ornamental *Prunus* spp.

Control

- Resistant varieties (Japanese cultivars)
- Removal of wild *Prunus* species
- Dormant season pruning
- Burn debris or bag and put in garbage

Brown Rot of Peaches, Nectarines, Cherries and Plums

Monolinia fructicola

Masses of spores that spread to nearby fruit

Disease Resistance: Peach Cultivars

Cultivar	Leaf Curl	Brown Rot	Bacterial Spot
Biscoe	-	S	R
Harken	MR	R	MR
South haven	-	S	R
Belle of Georgia	-	S	R
Carolina Gold	-	S	MR
Loring	-	S	R
Cherryred	-	S	R
Southern Pearl	-	S	R
Redhaven	MR	MR	MR
Frost	R	S	S

Brown Rot Resistance

- **Peaches**
  - Baygold No.5
  - Elberta
  - Glohaven
- **Apricot**
  - Goldcot
  - Harcot
  - Hargrand
- **Sour Cherries**
  - Stark Gold
  - Northstar Tart
- **No plum varieties**

Home Garden Cultural Practices for Managing Stone Fruit Fungal Diseases

- Site location with ~6 hr full sun exposure
- Fruit thinning
- Remove mummies (brown rot)
  - Tree and ground
- Pruning to increase air flow and remove branch cankers
- Removal of other host plants

Images courtesy of Thaddeus McCamant, Central Lakes College

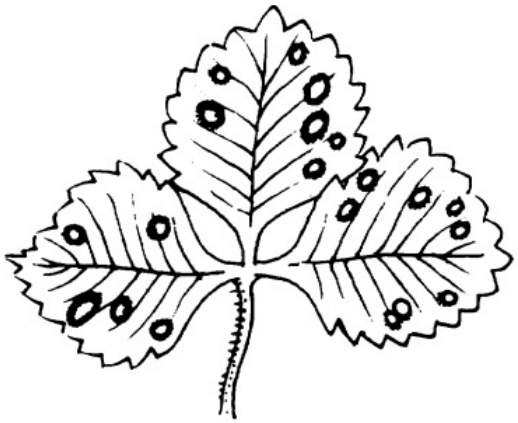
Home Garden Spray Program for Managing Peach and Nectarine Fungal Diseases

Product	Rate (per gal)	Timing (1st application)
Immunox	0.5 fl oz.	Pink/red bud
Captan	1.5 Tbsp.	Pink/red bud
Sulfur	1-3 Tbsp.	Pink/red bud

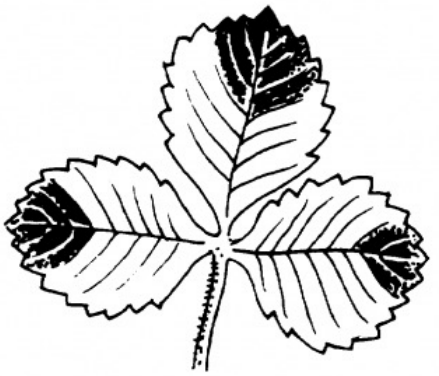
Small Fruit Diseases

Strawberry Fungal Leaf Diseases

Leaf Scorch



Leaf spot



Leaf blight

Neopestalotiopsis Disease

Powdery Mildew of Strawberry

- *Sphaerotheca macularis* f. sp. *fragariae*

Strawberry Fungal Leaf Diseases

- Management:
  - Purchase nursery stock from a reputable supplier
  - Resistant varieties (spot, scorch and PM only)

June Bearing	Ever Bearing
Allstar Cardinal Lester	Tribute Tristar

Strawberry Fungal Leaf Diseases

- Management:
  - Remove old leaves from plants before planting
  - Apply nitrogen only after renovation for matted rows
    - 1 to 2 lbs. of 10-10- 10 (or equivalent) per 100 square feet
  - Remove and burn plant debris after renovation

Strawberry matted row renovation

Gray Mold of Raspberry, Blackberry, and Strawberry

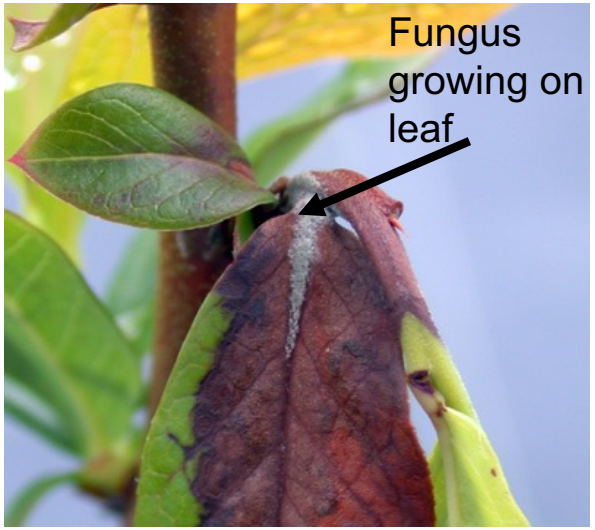
- *Botrytis cinerea*
- Blossom blight and fruit rot
- Favors cool and wet conditions

- Home Garden Management:
  - **No** resistant varieties
  - Prune canes for good air circulation
  - Plant in area with adequate sunlight (not a shaded area)

Blueberry Mummy Berry

Monilinia vaccinii-corymbosi

Cup-like structures that release spores

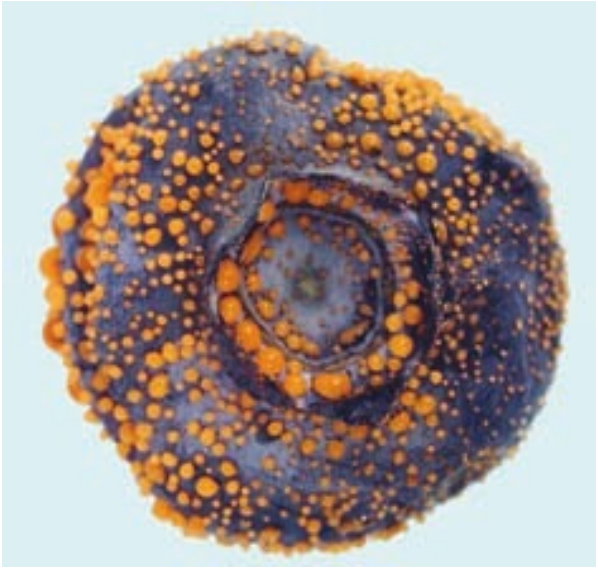


Fungus growing on leaf

Fungus growing in fruit

Anthracnose (Ripe Rot) of Blueberry

Colletotrichum acutatum

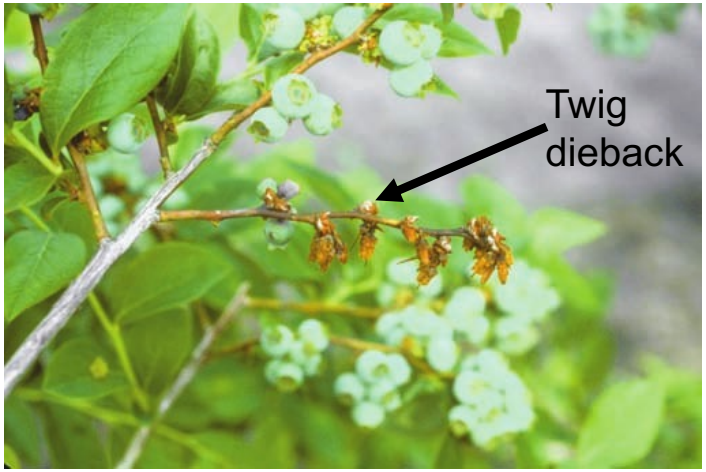


Blueberry Mummy Berry and Anthracnose Management for the Home Garden

- Plant resistant varieties
  - Mummy Berry: Bluejay, **Brigitta Blue**, Torro, Olympia
  - Anthracnose: **Brigitta Blue**, Elliot, Hannah's Choice, Legacy, Little Giant, Morrow, Murphy, Reveille
- Remove mummies from bush and burn or put in trash
- Rake (gently) and destroy mummies on the ground

Blueberry Phomopsis Twig and Leaf Spot

Phomopsis vaccinii



Phomopsis Twig Blight Management for the Home Garden

- Prune and destroy infected twigs during the dormant season
- Plant resistant varieties
  - Bluetta, Elliott, Rube

Brambles

Disease Resistance: Brambles

Disease	Blackberry	Red Raspberry	Black Raspberry
Anthracnose	**S** **thorny>thornless** **erect>trailing**	**S**	**MR**
Cane blight	**S**	**S**	**S**
Spur blight	**R**	**S**	**MR**
Orange Rust	**S to R**	**R**	**S**
Crown gall	S	S	S
Septoria leaf spot	S	MR	MR
Rosette	VS	R	R
Leaf and cane Rust	S	R	R
Powdery mildew	MR to R	S	S

Cane Blights

Cane blight
Leptosphaeria coniothyrium

Spur blight
Didymella applanata

Anthracnose
Elsinoe veneta

Winter Injury

- Confused with cane blight
- Red raspberries damaged at -20F
- Black and purple raspberries at -5F

- Prevention strategies
  - Maintain healthy plants
  - Row covers (trellised canes)
  - High tunnels

Home Garden Fungicides for Managing Bramble Fungal Diseases

Product	Rate (per gal)	Timing	Incompatibles
Lime sulfur (Sulforix)	8 Tbsp	Dormant to ¼ green on new leaves	Warm temperatures
Captan 50WP	3 Tbsp	Spring: 8-10 in. shoot growth Fall: After cane removal	Oils Lime

Home Garden Cultural Practices for Managing Cane Blights

- Minimize cane wounding
- Time pruning to allow time for healing before rain events
- Remove wild brambles
- **Prune out and destroy old canes after harvest**
- Protect canes from winter injury

Orange Rust

Arthuriomyces peckianus

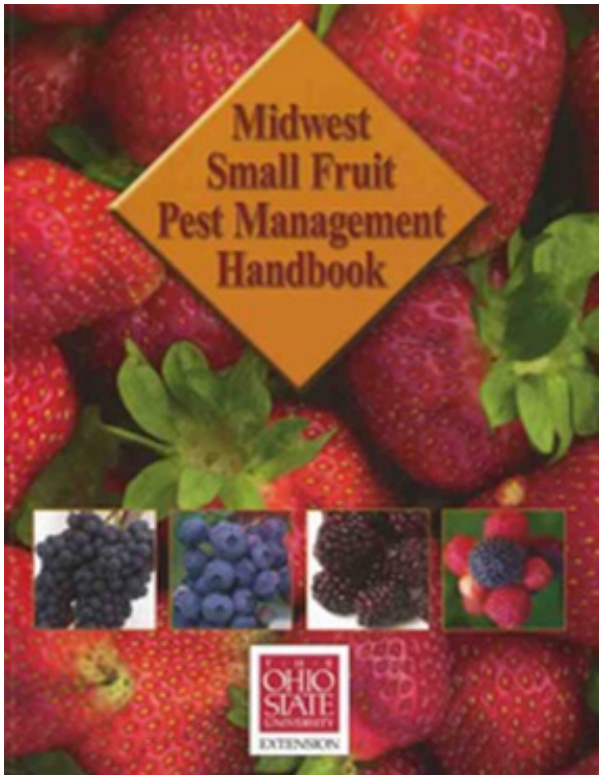
Home Garden Cultural Practices for Managing Orange Rust

- Plant red raspberry varieties
- Remove wild brambles
- **Prune out and destroy old canes after harvest**
- Thin healthy canes for good air circulation
- Remove diseased plants (including roots)

Resources-Fruit Pathology Website

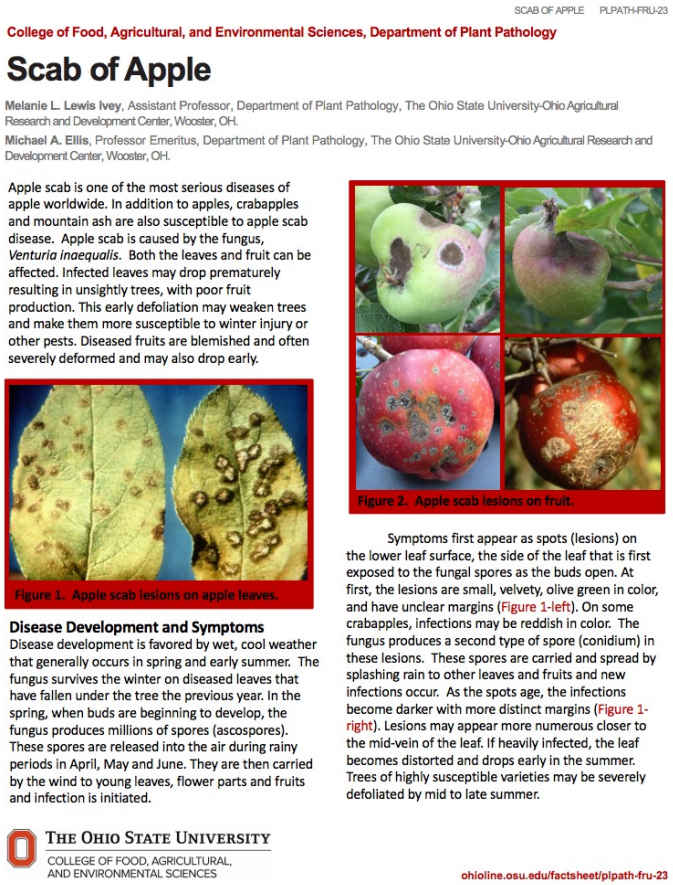
- Melanie L. Lewis Ivey
  - Ivey.14@osu.edu
  - 330-263-3849
- u.osu.edu/fruitpathology/

Resources-Midwest Small Fruit Pest Management Handbook



- Available for purchase on-line (extensionpubs.osu.edu)
- $29.75 + shipping

Resources-Disease Factsheet Series



College of Food, Agricultural, and Environmental Sciences, Department of Plant Pathology

Scab of Apple

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Michael A. Ellis, Professor Emeritus, Department of Plant Pathology, The Ohio State University-Ohio Agricultural Research and Development Center, Wooster, OH.

Apple scab is one of the most serious diseases of apple worldwide. In addition to apples, crabapples and mountain ash are also susceptible to apple scab disease. Apple scab is caused by the fungus, *Venturia inaequalis*. Both the leaves and fruit can be affected. Infected leaves may drop prematurely resulting in unsightly trees, with poor fruit production. This early defoliation may weaken trees and make them more susceptible to winter injury or other pests. Diseased fruits are blemished and often severely deformed and may also drop early.

Figure 1. Apple scab lesions on apple leaves.

Figure 2. Apple scab lesions on fruit.

Disease Development and Symptoms

Disease development is favored by wet, cool weather that generally occurs in spring and early summer. The fungus survives the winter on diseased leaves that have fallen under the tree the previous year. In the spring, when buds are beginning to develop, the fungus produces millions of spores (ascospores). These spores are released into the air during rainy periods in April, May and June. They are then carried by the wind to young leaves, flower parts and fruits and infection is initiated.

Symptoms first appear as spots (lesions) on the lower leaf surface, the side of the leaf that is first exposed to the fungal spores as the buds open. At first, the lesions are small, velvety, olive green in color, and have unclear margins (Figure 1-left). On some crabapples, infections may be reddish in color. The fungus produces a second type of spore (conidium) in these lesions. These spores are carried and spread by splashing rain to other leaves and fruits and new infections occur. As the spots age, the infections become darker with more distinct margins (Figure 1-right). Lesions may appear more numerous closer to the mid-vein of the leaf. If heavily infected, the leaf becomes distorted and drops early in the summer. Trees of highly susceptible varieties may be severely defoliated by mid to late summer.

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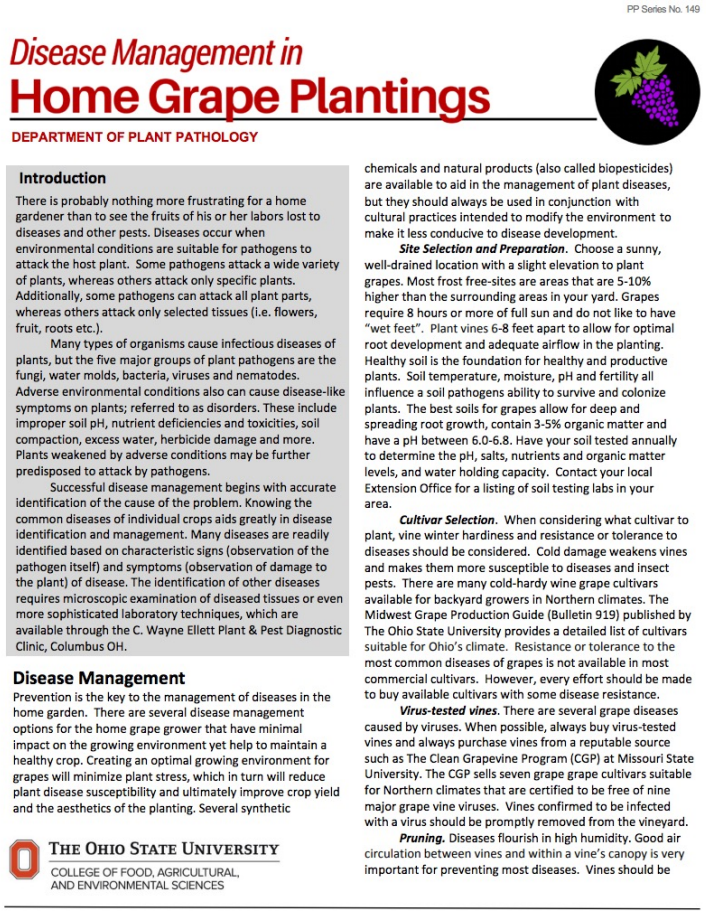
ohioline.osu.edu/factsheet/plpath-fru-23

- Digital only (u.osu.edu/fruitpathology)
- Multiple crops including hop

Resources-Disease Management in Home Plantings



PP Series No. 149

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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- Available for apple and grape
- Strawberry coming soon!
- Digital only (u.osu.edu/fruitpathology)

Resources-Ohio Fruit News


Supporting Fruit Production

OHIO FRUIT NEWS

Research and Recommendations from Experts at The Ohio State University

Grower's Corner

What can I do to control black root rot in my strawberry field?

In Ohio, black root rot is a common problem in established perennial, matted-row plantings. Black root rot is caused by multiple microbes including *Rhizoctonia*, *Pythium*, and root lesion nematode. Pre-plant chemical treatments to the soil or roots can prevent black root rot but it can be difficult to manage the disease once it shows up in a planting. Plant stress can increase disease severity so practices that promote a healthy plant are recommended. Adequate irrigation, mulching to prevent temperature stress and soil moisture, nitrogen application in late summer, and covering plants with straw to prevent winter injury will reduce plant stress. Post plant applications of fungicides aimed at the root system can also slow the decline of plants due to black root rot. Consult the Midwest Fruit Pest Management guide for fungicide recommendations.

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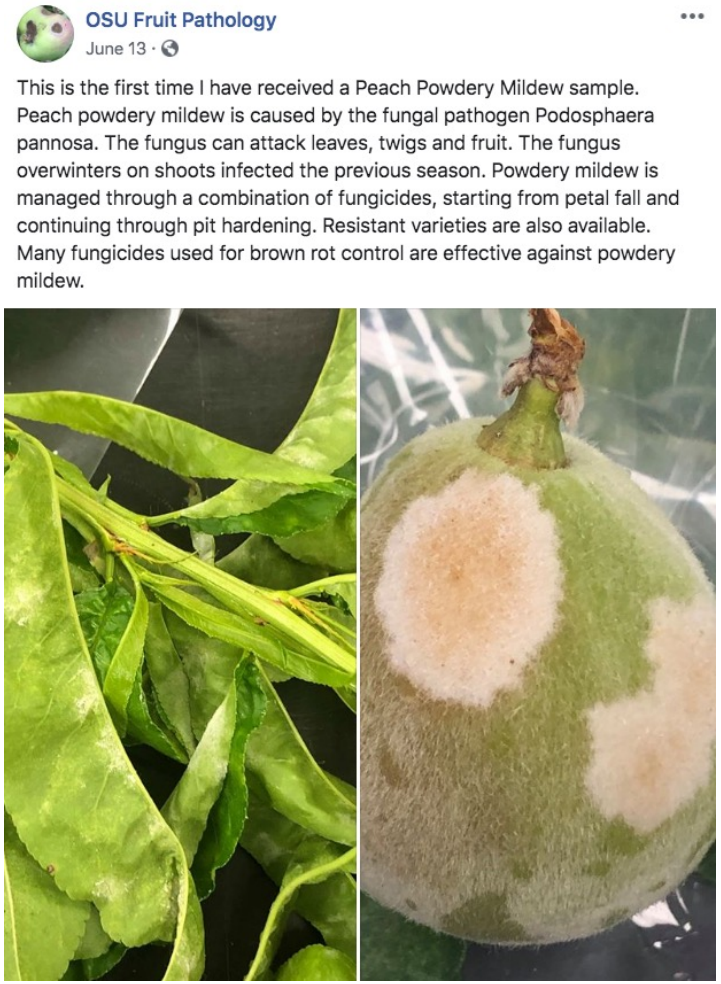
- Free
- Available on-line (u.osu.edu/fruitpathology)
- Via email (subscribe online)
- Hardcopy (provide mailing address)

Resources-Social Media



- OSUFruitPathology
- OSUGrapeIPM