

# Blueberry and Blackberry Diseases and Management

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## **Presentation Topics**

- 1. Integrated Disease Management
- 2. Blueberry Diseases & Management
- 3. Blackberry Diseases & Management
- 4. Small Fruit Disease Management Resources

#### The Disease Triangle

Susceptible host

Pathogen

•Environmental conditions that favor the pathogen



## CFAES

## Disease Management Begins Before Planting

- Select a location with:
  - full sun
  - healthy soil
  - good drainage
- Other considerations:
  - Soil depth
  - Wind direction
  - Morning vs. afternoon sun
  - Other host plants in the area





## Integrated Disease Management

# Use of multiple strategies to prevent and manage diseases

- 1. Host resistance
- 2. Clean planting stock
- 3. Monitoring and forecasting
- 4. Cultural and sanitation practices
- 5. Chemical and biological control
- 6. Pesticide resistance management





#### **Phomopsis Blight**

- Caused by the fungus *Phomopsis vaccinii*
- Canker, blossom, shoot, fruit, and rootstock phases

## CFAES

# Botryosphaeria Stem Blight

- Caused by the fungus *Botryosphaeria dothidea*
- Systemic pathogen
- Requires wound for infection
- High mortality rate in young plants







Images courtesy of MSU and NCSU



## Fungal Blights Management

- •Grow resistant varieties
- Cultural practices
  - Avoid mechanical damage to canes
  - Prune bushes during dormancy to open the canopy to light, air, and spray penetration

Chemicals

Delayed dormant Lime sulfur/Sulforix application



Figure 5. A) Cane canker caused by *C. acutatum* with acervuli in concentric circles around a leaf scar. B) Spore masses on a blueberry twig. C) Spore masses on old fruit spurs. D) Spore masses on flower bud scales.

Photo credit: T. Miles, MSU

#### Ripe Rot (Anthracnose)

- Caused by the fungus Colletotrichum acutatum species complex
- Warm, wet conditions favor disease development



Ripe Rot (Anthracnose)
Caused by the fungus Colletotrichum acutatum species complex



# **Ripe Rot Management**

•Grow resistant varieties (see table)

- Cultural practices
  - Prune bushes to open the canopy to light, air, and spray penetration
  - Remove and destroy pruned material
  - Harvest regularly and rapid cooling after harvest
- Chemicals
  - Lime sulfur/Sulforix during dormant period
  - Critical period is bloom to pea-size green



Pea-size green fruit

Susceptible	Moderately susceptible	Moderately resistant	Resistant
BluecropLateblueBluegoldNuiBluerayOlympiaBluettaPatriotCara's ChoicePembertonChanticleerPuruDarrowRancocasEarliblueSierraHardyblueSpartanHerbertToroKatherine	Berkeley Northland Bluejay O'Neal Bonus Reka Cabot Rubel Collins Stanley Hannah's Choice Sunrise Jersey Weymouth Nelson	Aurora Blue Rose Blue Haven Brigitta Blue Elizabeth Croatan* Murphy* Duke*	Elliott Draper Legacy Liberty

\*Duke, Murphy and Croatan show field resistance even though they were susceptible or moderately susceptible in the inoculation tests.

Table 1) Susceptibility of highbush blueberry cultivars to anthracnose fruit rot. Rating is based on field observations as well as the proportion of fruit decay after artificial inoculation: 0-15%= resistant, 16-30%= moderately resistant, 31-50%= moderately susceptible, and 51-100%= susceptible (Polashock et al., 2005, Plant Disease 89:33-38)

#### Ripe Rot (Anthracnose) Resistant Varieties



Photo credit: Jerry Weiland, USDA-ARS

Phytophthora Root Rot
Caused by the oomycete (water mold) *Phytophthora* cinnamomi



Photo credit: N.Ward, UK

# Phytophthora Root Rot Necrotic lesions on roots (A and B)

- Dark brown or black lesions on canes (C)



## Phytophthora Root Rot Management

Plant disease-free nursery stock

Early detection

- •Water management
  - Good soil drainage
  - Level ground (avoid standing water)
  - Raised beds (12 in., sloped edges)
  - Clean water (avoid surface water)
- Chemicals
  - mefenoxam (spring and fall)
  - phosphorous acid







Blueberry mosaic associated virus

Blueberry leaf mottle virus

#### Viruses

- 13 viruses known to infect blueberry
- Asymptomatic and symptomatic; lethal and non-lethal

#### Survey of Blueberry Farms in Ohio

- 27 farms
- 19 counties















Virus	Transmission	Prevalence (n=27)
Blueberry latent virus*	pollen	52%
Blueberry mosaic associated virus	fungi	33%
Blueberry leaf mottle virus	pollen	4%
Blueberry virus A*	probably aphids	26%
Tomato ringspot virus	dagger nematodes	22%
Tobacco ringspot virus	dagger nematodes	7%
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\*asymptomatic disease

#### Prevalence of Blueberry Viruses in Ohio



## **Viral Disease Prevention**







Spring infections of leaves Fall infections of buds of rooting cane tips

#### Orange Rust

- Caused by the fungi Arthuriomyces peckianus or Gymnoconia nitens
- Hosts include black and purple raspberries and most blackberries





## Orange Rust Management

Plant clean nursery stock

Cultural practices

- Remove and burn <u>plants</u> as soon as symptoms appear
- Remove wild brambles
- Chemicals
  - Not effective once spores are released





## Blackberry Downy Mildew

- •Caused by Peronospora sparsa
- Systemic pathogen
- •Symptoms occur on leaves and fruit (dry berry)
- •Hosts:
  - blackberry (thorny and thornless)
  - boysenberry
  - raspberry hybrids (red and black)
  - roses





## CFAES

#### Blackberry Downy Mildew Management

- •Plant clean nursery stock
- Do not plant near roses
- Cultural practices
  - Prune bushes to open the canopy to light, air, and spray penetration
  - Remove and destroy pruned material
  - Remove wild hosts
- •Chemicals
  - Once sporangia are first observed (63-65 F, 80% RH)
  - 7-10 spray intervals



#### **National Clean Plant Network-Berries**

#### Welcome to the National Clean Plant Network for Berries

The National Clean Plant Network for Berries (NCPN-B) produces clean planting stock for berry crops. NCPN-B is part of a network of clean plant centers in the United States that conducts diagnostics and pathogen elimination services and maintain pathogen tested plant materials for nurseries so they can be included in state certification programs.

Production of berry crops such as strawberries, blueberries, raspberries, and blackberries, starts with clean plant material. Healthy plants are easier to propagate and produce higher yields and better quality fruit.



Berry Clean Plant Network https://www.ncpnberries.org/

## Small Fruit Disease Diagnostic

- Wooster
   Campus
- Commercial samples



- 27 counties
- 2 out-of-state

61 samples in 2020

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- 76 samples in 2019
- 118 samples in 2018



u.osu.edu/fruitpathology/diagnostics/

### **Ohio Fruit** News

- Electronic delivery
- Available at **Produce Auctions** across the state



#### OCTOBER 2020

#### Summer Fungal Fruit Rots and Their Management

#### By Lianna M. Wodzicki- Graduate Research Assistant

\* This article was first published as a blog on the Smart Apple Spray website.

As the final cover sprays are applied in apple orchards, you may notice some unsightly spots on your fruit. Fungal fruit rots can cause significant losses in yield and reduce fruit quality. These diseases often appear just prior to harvest, during harvest, or in storage.



Bitter rot (C. acutatum) symptoms on the apple surface (top) and internally (bottom).

If these rots are not prevented through the integration of sanitation and cultural practices, and often fungicides, they can cause severe losses. The expression "one bad apple spoils the whole barrel" is a good description of what fruit rot can do. Bitter rot, black rot, and white rot are the three disease that cause the most damage to fruit, often rendering them unsalable.

Bitter rot (caused by the Colletotrichum acutatum fungal complex) is characterized by brown, sunken spots. After rain periods, these spots can develop masses of orange spores on the surface. Internally, the discoloration of the flesh tapers down to the core in a V shape. The discolored flesh is corky or spongy to the touch. Bitter rot is a major problem in Ohio due to prevalence of warm and humid summers. Diseased fruit, infected twigs and mummified fruit (in the tree and on the ground) are the primary

sources of these fungi.

Black rot (caused by the fungus Botryosphaeria obtusa) is a dry rot that almost always starts at the calyx (blossom end) of the fruit. The spots are dark brown and black in color with black specks (fungal fruiting structures) scattered over the lesions. Unlike bitter rot lesions, black rot lesions are not sunken. In addition to fruit symptoms, this fungus can cause a leaf spot (frogeve) and/or sunken cankers on branches.

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#### Pest Management Guide

- Electronic
- Hardcopies available in spring

#### Midwest Fruit Pest Management Guide 2019-2020

Arkansas University of Arkansas Cooperative Extension Service AG1304

Illinois University of Illinois Extension ICSG-18

Indiana Purdue Extension ID-465

Iowa Iowa State University Extension and Outreach HORT 3035

Kansas Kansas State Research and Extension MF3278

Kentucky University of Kentucky Cooperative Extension Service ID-232

Minnesota University of Minnesota Extension

Missouri University of Missouri Missouri State University MX398

Nebraska University of Nebraska — Lincoln Extension

Ohio Ohio State University Extension Bulletin 506

Oklahoma Oklahoma State University Oklahoma Cooperative Extension Service E-987

West Virginia West Virginia University Extension Service Publication 865

Wisconsin University of Wisconsin-Extension A4104





#### FRUIT PATHOLOGY LAB

### Safe Fruit Production

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