

## Talks for the General Public

### Diseases of Herbaceous Ornamentals

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### Diseases of Herbaceous Ornamentals Damping-Off/Seedling Blights

- Pathogens
  - *Pythium* spp.
  - *Rhizoctonia solani*
  - *Fusarium* spp.
- Hosts: Any herbaceous ornamental
- Favorable environment: Cool, wet soils



### Diseases of Herbaceous Ornamentals Damping-Off/Seedling Blights

- Control
  - Use a pasteurized soil mixture
  - Decontaminate pots/working surfaces/tools (bleach, 70% alcohol, disinfectants)
  - Moderate soil moisture
    - Use a soil with adequate drainage
    - DO NOT over-water
  - Germinate seeds at higher temperatures

### Diseases of Herbaceous Ornamentals Damping-Off/Seedling Blights

- Control
  - Use fungicides to protect seedlings
    - Captan
    - *Streptomyces lydicus*
    - *Trichoderma* spp., *Gliocladium* spp., *Pseudomonas* spp., *Bacillus* spp.
    - Apply as a seed treatment or drench

### Diseases of Herbaceous Ornamentals Powdery Mildews

- Pathogens
  - *Erysiphe* spp.
  - *Uncinula* spp.
  - *Phyllactinia* spp.
  - *Blumeria* spp.
  - *Oidium* spp.
  - *Microsphaera* spp.
  - *Sphaerotheca* spp.
  - *Podosphaera* spp.
  - *Brasiliomyces* spp.
  - *Ovulariopsis* spp.
- Hosts: Virtually anything
- Favorable environment: High humidity



### Diseases of Herbaceous Ornamentals Powdery Mildews

- **Control**
  - Remove diseased plant material and debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost
  - Reduce humidity
    - Plant less densely
    - Thin existing stands
  - Use resistant cultivars/varieties

### Diseases of Herbaceous Ornamentals Powdery Mildews

- **Control**
  - Use fungicides to prevent infections
    - Dithiocarbamates, myclobutanil, propiconazole, tebuconazole, thiophanate-methyl
    - Sulfur, neem oil, other plant-based oils
    - Baking soda (1.5 Tbsp/gal) and light weight horticultural oil (3 Tbsp/gal)
    - Alternate active ingredients (FRAC Codes)
    - Apply when humidity >60-70%
    - Apply at 7-14 day intervals

### Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- **Pathogens:** *Plasmopara obducens*
- **Hosts**
  - Standard garden impatiens (*I. walleriana*)
  - Balsam impatiens (*I. balsamina*)
  - Jewelweed (*I. pallida*, *I. capensis*)
  - New Guinea impatiens (*I. hawkeri*) (resistant/tolerant)
- **Favorable environment:** Wet weather



### Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- Control
  - DO NOT grow impatiens in the same location every year
  - Grow tolerant/resistant/immune plants
  - Start with clean transplants and seed
  - Keep materials from different sources physically separated
  - DO NOT overcrowd plants
  - DO NOT overhead water

### Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- Control
  - Watch carefully for the disease
  - Bag and discard affected plants
    - Symptomatic plants
    - Asymptomatic surrounding plants
  - Disinfest contaminated materials (70% alcohol, disinfectants, bleach)

### Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- Control
  - Use fungicides to prevent infections
    - Mancozeb
    - Apply at 7 day intervals

### Diseases of Herbaceous Ornamentals Daylily Leaf Streak

- Pathogen: *Aureobasidium microstictum*
- Host: Daylily
- Favorable environment: Wet weather



### Diseases of Herbaceous Ornamentals Daylily Leaf Streak

- Control
  - Promote rapid drying of leaves
    - Divide large clumps
    - Plant less densely
  - DO NOT overhead water
  - Remove diseased leaves and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost

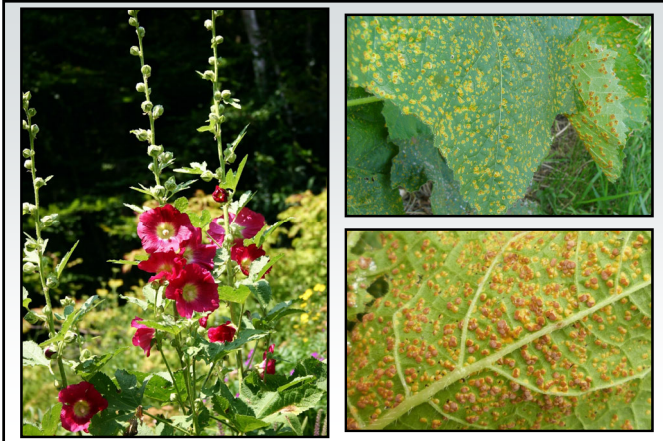


## Diseases of Herbaceous Ornamentals Daylily Leaf Streak

- **Control**
  - Use varieties that are less susceptible
    - ‘Betty Bennet’, ‘Edna Spalding’, ‘Ella Pettigrew’, ‘Globe Trotter’, ‘Nancy Hicks’, ‘Pink Superior’, ‘Ron Rousseau’, ‘Sudie’, ‘Tropical Tones’, ‘Upper Room’, ‘Winsome Lady’
  - Use fungicides to prevent infections
    - Chlorothalonil, mancozeb, thiophanate-methyl
    - Alternate active ingredients (FRAC Codes)
    - Apply at 7-14 day intervals

## Diseases of Herbaceous Ornamentals Hollyhock Rust

- **Pathogen:** *Puccinia malvacearum*
- **Hosts**
  - Hollyhock
  - Other plants in the mallow family
- **Favorable environment**
  - Wet weather
  - Cool to moderate temperatures



## Diseases of Herbaceous Ornamentals Hollyhock Rust

- **Control**
  - Buy rust-free hollyhock plants
  - Grow rust resistant hollyhock varieties
  - Remove weedy mallow species
  - Promote rapid drying of leaves
    - Plant less densely
    - Thin existing plant stands

## Diseases of Herbaceous Ornamentals Hollyhock Rust

- **Control**
  - DO NOT overhead water
  - DO NOT overwater
  - Remove diseased leaves and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost

## Diseases of Herbaceous Ornamentals Hollyhock Rust

- **Control**
  - Use fungicides to prevent infections
    - Chlorothalonil, mancozeb, myclobutanil, tebuconazole, triticonazole
    - Alternate active ingredients (FRAC Codes)
    - Apply during periods of high moisture (particularly early in the growing season)
    - Apply at 7-14 day intervals

**Diseases of Herbaceous Ornamentals**  
**Botrytis Blight/Gray Mold**

- Pathogen: *Botrytis cinerea*
- Hosts
  - Virtually any herbaceous plant
  - Flowering plants
    - Geranium
    - Peony
    - Dahlia
- Favorable environment: Wet weather



**Diseases of Herbaceous Ornamentals**  
**Botrytis Blight/Gray Mold**

- Control
  - Remove infested plant debris/infect plant parts
    - Burn (where allowed)
    - Deep bury
    - Hot compost
  - Remove aging plant parts
  - Promote rapid drying
    - Plant less densely
    - Thin existing plant stands

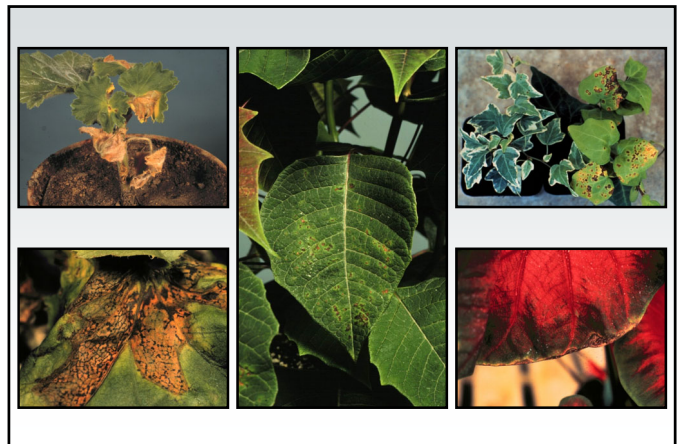
**Diseases of Herbaceous Ornamentals**  
**Botrytis Blight/Gray Mold**

- Control
  - DO NOT overhead water
  - DO NOT overwater
  - Use fungicides to prevent infections
    - Chlorothalonil, copper, fludioxonil, mancozeb, thiophanate-methyl
    - Alternate active ingredients (FRAC Codes)
    - Apply during periods of high moisture
    - Apply at 7-14 day intervals

**Diseases of Herbaceous Ornamentals**  
**Xanthomonas Leaf Diseases**

- Pathogens: *Xanthomonas* spp.
- Hosts
 

– Geranium	– Begonia
– Poinsettia	– Ivy
– Anthurium	– Others
- Favorable environment: Wet weather



## Diseases of Herbaceous Ornamentals Xanthomonas Leaf Diseases

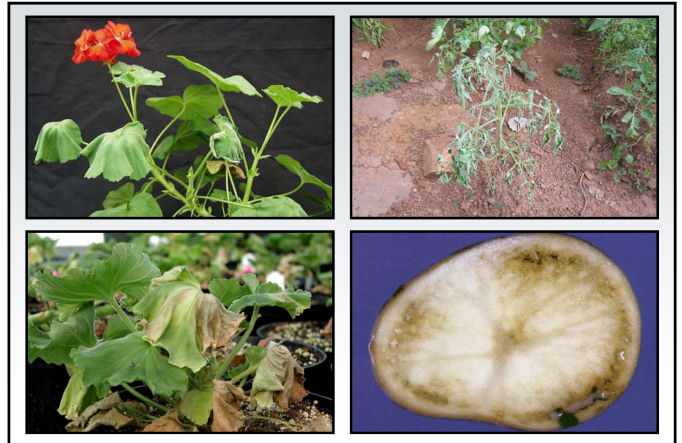
- **Control**
  - Inspect plants before purchase
  - Promote rapid drying of leaves
    - Plant less densely
    - Thin dense stands
  - **DO NOT** overhead water
  - **DO NOT** handle plants when wet
  - Be cautious carrying over plants from year to year

## Diseases of Herbaceous Ornamentals Xanthomonas Leaf Diseases

- **Control**
  - Remove diseased leaves and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost
  - Disinfest contaminated materials (70% alcohol, disinfectants, bleach)
  - **DO NOT** use bactericides for control

## Diseases of Herbaceous Ornamentals Ralstonia Wilt

- **Pathogen: *Ralstonia solanacearum***
  - Races (host range-based classification)
  - Biovars (sugar usage-based classification)
- **Hosts**
  - Geranium and other herbaceous ornamentals
  - Vegetables (potato and tomato)
- **Favorable environment: Warm, wet weather**



## Diseases of Herbaceous Ornamentals Ralstonia Wilt

- **Control**
  - Inspect plants before purchase
  - Keep plants from different sources separated
  - Disinfest contaminated materials (70% alcohol, disinfectants, bleach)
  - Routinely wash hands with soap and water
  - If you suspect that you have this disease, contact the PDDC!

## Diseases of Herbaceous Ornamentals Aster Yellows

- **Pathogen: Aster yellows phytoplasma**
- **Hosts**
  - Many plants in the Asteraceae (aster family)
  - Many other plants in many other plant families
- **Favorable environment: None**
- **Vector: Aster leafhopper**



## Diseases of Herbaceous Ornamentals Aster Yellows

- **Control**
  - Remove diseased plants
    - Hot compost
    - Bury
    - Burn (where allowed)
  - Control leafhopper vector (?)

## Diseases of Herbaceous Ornamentals Tobacco Mosaic

- **Pathogen:** *Tobacco mosaic virus (TMV)*
- **Hosts**
  - Many herbaceous ornamentals
  - Many vegetables
- **Favorable environment:** None
- **Transmission: Mechanical**
  - Touch
  - Tools



## Diseases of Herbaceous Ornamentals Tobacco Mosaic

- **Control**
  - Buy plants from a reputable source
  - Inspect plants for symptoms
  - Test plants prior to purchase
  - **DO NOT** smoke around plants
  - Wash hands routinely with soap and water
  - Keep weeds under control
  - Landfill diseased plants and plant debris

## Diseases of Herbaceous Ornamentals Tobacco Mosaic

- **Control**
  - Disinfest contaminated materials
    - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¾ Tbsp/gal)
    - Trisodium phosphate (14 dry oz/gal)
    - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9½ cups + ¼ tsp/gal)
    - Alcohol dip followed by flaming
  - **DO NOT** use chemical controls on plants



## Diseases of Herbaceous Ornamentals Cucumber Mosaic

- **Pathogen:** *Cucumber mosaic virus* (CMV)
- **Hosts**
  - Many herbaceous ornamentals
  - Many vegetables
- **Favorable environment:** None
- **Transmission**
  - Insect (aphids)
  - Mechanical (contaminated tools)



## Diseases of Herbaceous Ornamentals Cucumber Mosaic

- **Control**
  - Buy plants from a reputable source
    - Inspect plants for symptoms
    - Test plants prior to purchase
  - Keep weeds under control
  - Remove diseased plants and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost

## Diseases of Herbaceous Ornamentals Cucumber Mosaic

- **Control**
  - Disinfest contaminated materials
    - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¼ Tbsp/gal)
    - Trisodium phosphate (14 dry oz/gal)
    - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9½ cups + ¼ tsp/gal)
    - Alcohol dip followed by flaming
  - DO NOT use chemical controls on plants
  - DO NOT use insecticides for aphid control

## Diseases of Herbaceous Ornamentals Tospovirus Diseases

- **Diseases**
  - Tomato spotted wilt
  - Impatiens necrotic spot
- **Pathogens**
  - *Tomato spotted wilt virus* (TSWV)
  - *Impatiens necrotic spot virus* (INSV)

## Diseases of Herbaceous Ornamentals Tospovirus Diseases

- **Hosts**
  - Many herbaceous ornamentals
  - Many vegetables
- **Favorable environment:** None
- **Transmission**
  - Insects (thrips)
  - Mechanical (contaminated tools)





## Diseases of Herbaceous Ornamentals Tospovirus Diseases

- **Control**
  - Buy plants from a reputable source
    - Inspect plants for symptoms
    - Test plants prior to purchase
  - Keep weeds under control
  - Remove diseased plants and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost

## Diseases of Herbaceous Ornamentals Tospovirus Diseases

- **Control**
  - Use insecticides to control thrips
  - Disinfest contaminated materials
    - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¼ Tbsp/gal)
    - Trisodium phosphate (14 dry oz/gal)
    - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9½ cups + ¾ tsp/gal)
    - Alcohol dip followed by flaming
  - **DO NOT** use chemical controls on plants

## Diseases of Herbaceous Ornamentals Hosta Virus X

- **Pathogen:** *Hosta virus X* (HVX)
- **Host:** Hosta
  - ‘Gold Edger’
  - ‘Gold Standard’
  - ‘Golden Tiara’
  - ‘Striptease’
  - ‘Sum and Substance’
- **Favorable environment:** None

## Diseases of Herbaceous Ornamentals Hosta Virus X

- **Transmission: Mechanical**
  - Shovels
  - Knives
  - String edgers
  - Lawnmowers



## Diseases of Herbaceous Ornamentals Hosta Virus X

- **Control**
  - Buy hostas from a reputable source
    - Inspect hostas for symptoms
    - Test hostas prior to purchase
  - Keep new and established hostas separated
  - Remove diseased plants and plant debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost

## Diseases of Herbaceous Ornamentals Hosta Virus X

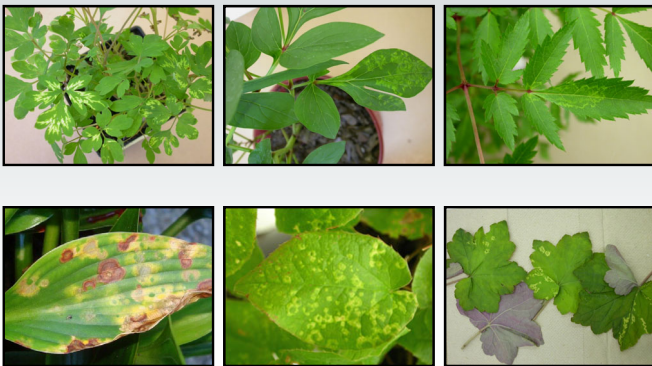
- **Control**
  - Disinfest contaminated materials
    - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¾ Tbsp/gal)
    - Trisodium phosphate (14 dry oz/gal)
    - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9½ cups + ¼ tsp/gal)
    - Alcohol dip followed by flaming
  - **DO NOT** use chemical controls on plants

## Diseases of Herbaceous Ornamentals Tobacco Rattle

- **Pathogen:** *Tobacco rattle virus* (TRV)
- **Hosts**
  - **Ornamentals**
    - Astilbe, bleeding heart, columbine, coral bells, daffodils, epimedium, gladiolus, hyacinth, marigold, peony, tulip, vinca
  - **Vegetables**
    - Beans, beet, pepper, potato, spinach
- **Favorable environment:** None

## Diseases of Herbaceous Ornamentals Tobacco Rattle

- **Transmission**
  - Stubby-root nematodes
    - *Trichodorus* spp.
    - *Paratrichodorus* spp.
  - Mechanical
  - Grafting
  - Seed



## Diseases of Herbaceous Ornamentals Tobacco Rattle

- **Control**
  - **DO NOT** buy symptomatic plants
  - Grow non-susceptible plants
    - Annual phlox, carnation, devil's trumpet (downy thorn-apple), sweet William, zinnia, zombie cucumber
  - Remove and destroy infected plants
    - Burn (where allowed)
    - Deep bury
    - Hot compost

## Diseases of Herbaceous Ornamentals Tobacco Rattle

- **Control**
  - Disinfest contaminated materials
    - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¼ Tbsp/gal)
    - Trisodium phosphate (14 dry oz/gal)
    - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9½ cups + ¼ tsp/gal)
    - Alcohol dip followed by flaming

## Diseases of Herbaceous Ornamentals Tobacco Rattle

- **Control**
  - DO NOT use chemical controls on plants
  - DO NOT attempt to control stubby-root nematodes

## Diseases of Herbaceous Ornamentals Foliar Nematode

- **Pathogen:** *Aphelenchoides* spp.
- **Hosts**
  - Many types of herbaceous plants
  - Landscape plants
    - Hosta, begonia, coral bells, miterwort
  - Houseplants
    - African violets, ferns, chrysanthemum
- **Favorable environment:** Wet weather



## Diseases of Herbaceous Ornamentals Foliar Nematode

- **Control**
  - Inspect plants prior to purchase
  - Avoid overhead watering
  - Remove symptomatic plants and plant debris
    - Burn (where allowed)
    - Deep bury (landfill)
    - Hot compost

## Diseases of Herbaceous Ornamentals Foliar Nematode

- **Control**
  - Disinfest contaminated materials (70% alcohol, disinfectants, bleach)
  - Hot water treatments (10 minutes at 125°F)
  - DO NOT use nematicides

## Diseases of Herbaceous Ornamentals Southern Blight

- Pathogen: *Sclerotium rolfsii*
- Hosts
  - Many herbaceous annuals and perennials
    - Hosta
    - Bedding plants
  - Some woody ornamentals
- Favorable environment: Warm, wet weather



## Diseases of Herbaceous Ornamentals Southern Blight

- Control
  - DO NOT buy infected/infested plants
  - Avoid cocoa mulch (?)
  - Remove infected plants, mulch and soil
    - Double bag and landfill
  - Disinfect contaminated materials  
(70% alcohol, disinfectants, bleach)

## Diseases of Herbaceous Ornamentals Southern Blight

- Control
  - Amend soil with organic matter (?)
  - Use fungicides for control
    - Contract with a professional pesticide applicator
    - Azoxystrobin, flutolanil, flutolanil + thiophanate-methyl, PCNB, tebuconazole, triadimefon
    - Alternate active ingredients (FRAC codes)
    - Apply at 14 – 28 day intervals
  - Pray for a really, really, REALLY cold winter

## Diseases of Herbaceous Ornamentals Root/Crown Rots

- Pathogens
 

– <i>Pythium</i> spp.	– <i>Phytophthora</i> spp.
– <i>Rhizoctonia solani</i>	– <i>Fusarium</i> spp.
– <i>Cylindrocarpon</i> spp.	– <i>Thielaviopsis</i> spp.
- Hosts: Any herbaceous plant
- Favorable environment: Cool, wet soils





## Diseases of Herbaceous Ornamentals Root/Crown Rots

- **Control**
  - Moderate soil moisture
    - Grow plants in well-drained sites
    - Use a potting mix with adequate drainage
  - Improve drainage in poorly drained soils
    - Add organic matter to improve drainage
    - Use raised beds
  - DO NOT overwater
  - DO NOT overmulch

## Diseases of Herbaceous Ornamentals Root/Crown Rots

- **Control**
  - Pretest soils/mulches/composts
  - Use a soil-less potting mix or a pasteurized potting mix for containerized plants
  - DO NOT move contaminated soil or plants
  - Disinfest contaminated materials (70% alcohol, disinfectants, bleach)

## Diseases of Herbaceous Ornamentals Root/Crown Rots

- **Control**
  - Use fungicides to prevent infections
    - Contract with a professional pesticide applicator
    - Etridiazole, metalaxyl, mefenoxam, fosetyl-Al, PCNB, thiophanate-methyl, fludioxonil
    - Alternate active ingredients (FRAC codes)
    - Use granular formulations if possible
    - Use during periods of wet weather

## Diseases of Herbaceous Ornamentals Root/Crown Rots

- **Control**
  - Use biopesticides to prevent infections
    - *Trichoderma*, *Gliocladium*
    - Use for potted plants
    - Exercise caution when combining with chemical fungicides

## Diseases of Herbaceous Ornamentals Where to Go for Help

Plant Disease Diagnostics Clinic  
Department of Plant Pathology  
University of Wisconsin-Madison  
1630 Linden Drive  
Madison, WI 53706-1598  
(608) 262-2863  
pddc@wisc.edu  
<https://pddc.wisc.edu>

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