

Advanced Master Gardener Training

Diseases of Herbaceous Ornamentals

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Diseases of Herbaceous Ornamentals Damping-Off/Seedling Blights

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

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Diseases of Herbaceous Ornamentals Damping-Off/Seedling Blights

- **Control**
 - Use a pasteurized soil mixture
 - Decontaminate pots/working surfaces/tools (10% bleach, 70% alcohol, disinfectants)
 - Moderate soil moisture
 - Use a soil with adequate drainage
 - DO NOT over-water
 - Germinate seeds at higher temperatures

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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

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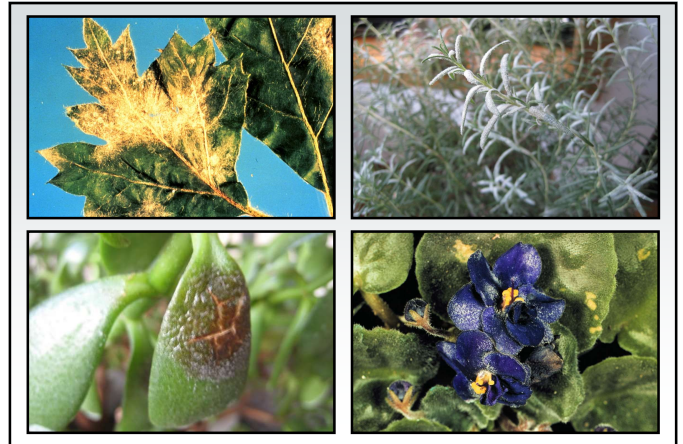
Diseases of Herbaceous Ornamentals Powdery Mildews

- **Cause**
 - *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

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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

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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

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Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- **Cause:** *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

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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

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Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

- Control
 - Watch carefully for the disease
 - Bag and discard affected plants
 - Symptomatic plants
 - Asymptomatic surrounding plants
 - Disinfect contaminated materials (70% alcohol, disinfectants, 10% bleach)

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Diseases of Herbaceous Ornamentals Impatiens Downy Mildew

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

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Diseases of Herbaceous Ornamentals Daylily Leaf Streak

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

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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

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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

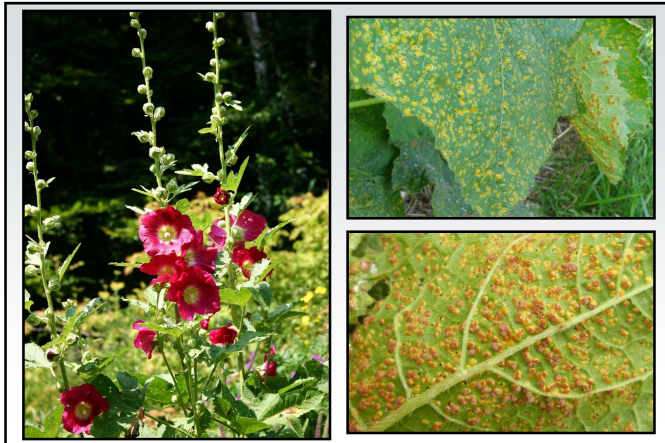
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Diseases of Herbaceous Ornamentals

Hollyhock Rust

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

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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

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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

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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

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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

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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

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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

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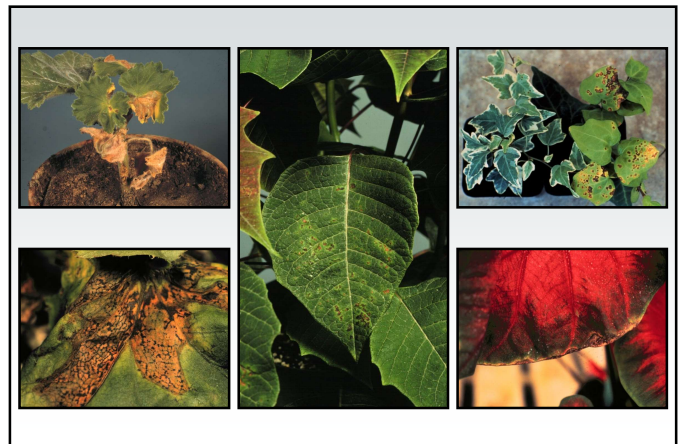
Diseases of Herbaceous Ornamentals

Xanthomonas Leaf Diseases

- Causes: *Xanthomonas* spp.
- Hosts

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

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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

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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, 10% bleach)
 - DO NOT use bactericides for control

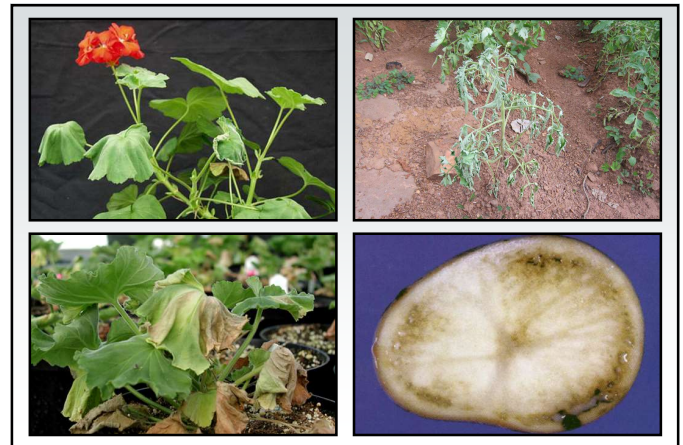
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Diseases of Herbaceous Ornamentals

Ralstonia Wilt

- **Cause:** *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

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Diseases of Herbaceous Ornamentals

Ralstonia Wilt

- **Control**
 - Inspect plants before purchase
 - Keep plants from different sources separated
 - Disinfest contaminated materials (70% alcohol, disinfectants, 10% bleach)
 - Routinely wash hands with soap and water
 - If you suspect that you have this disease, contact the PDDC!

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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

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Diseases of Herbaceous Ornamentals Aster Yellows

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

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Diseases of Herbaceous Ornamentals Tobacco Mosaic

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

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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

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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 + ¾ tsp/gal)
 - Alcohol dip followed by flaming
 - DO NOT use chemical controls on plants

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Diseases of Herbaceous Ornamentals

Cucumber Mosaic

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

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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

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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

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Diseases of Herbaceous Ornamentals

Tospovirus Diseases

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

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Diseases of Herbaceous Ornamentals

Tospovirus Diseases

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

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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

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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 + 2¾ 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

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Diseases of Herbaceous Ornamentals Hosta Virus X

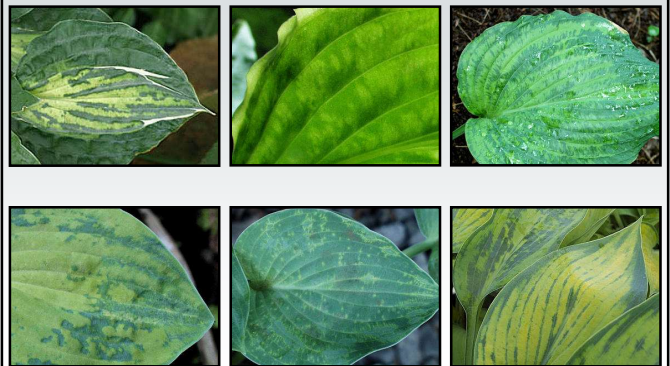
- **Cause:** *Hosta virus X* (HVX)
- **Host:** Hosta
 - ‘Gold Edger’
 - ‘Gold Standard’
 - ‘Golden Tiara’
 - ‘Striptease’
 - ‘Sum and Substance’
- **Favorable environment:** None

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Diseases of Herbaceous Ornamentals Hosta Virus X

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

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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

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Diseases of Herbaceous Ornamentals

Hosta Virus X

- **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

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Diseases of Herbaceous Ornamentals

Tobacco Rattle

- **Cause:** *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

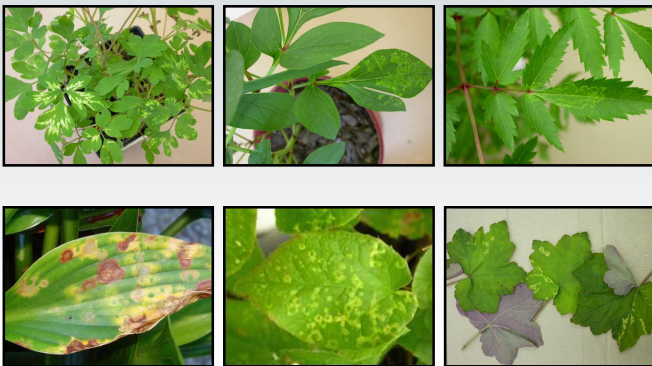
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Diseases of Herbaceous Ornamentals

Tobacco Rattle

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

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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

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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

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Diseases of Herbaceous Ornamentals Tobacco Rattle

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

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Diseases of Herbaceous Ornamentals Foliar Nematode

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

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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

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Diseases of Herbaceous Ornamentals Foliar Nematode

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

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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

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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, 10% bleach)

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Diseases of Herbaceous Ornamentals Southern Blight

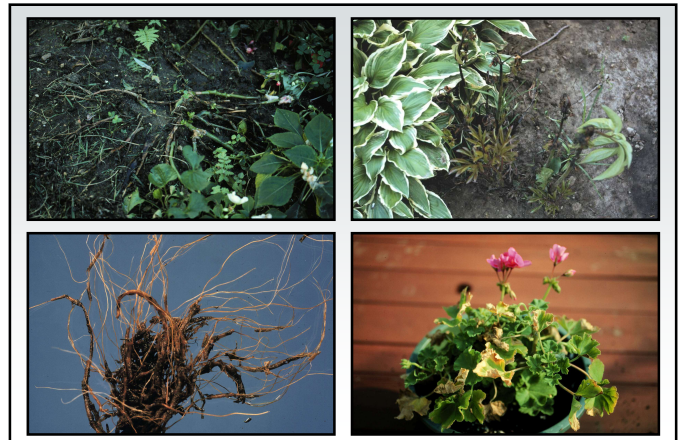
- Control
 - Amend soil with organic matter (?)
 - Use fungicides for control
 - Contract with a professional pesticide applicator
 - Azoxystrobin, flutolanil, flutolanil + thiophanate-methyl, PCNB, tebuconazole, triadimefon
 - Alternate active ingredients (FRAC codes)
 - Apply at 14 – 28 day intervals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

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Diseases of Herbaceous Ornamentals Root/Crown Rots

- Pathogens
 - *Pythium* spp. – *Phytophthora* spp.
 - *Rhizoctonia solani* – *Fusarium* spp.
 - *Cylindrocarpon* spp. – *Thielaviopsis* spp.
- Hosts: Any herbaceous plant
- Favorable environment: Cool, wet soils

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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

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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, 10% bleach)

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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

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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

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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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