

Horticulture 334

Diseases of Greenhouse Crops

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Diseases of Greenhouse Crops Damping-Off/Seedling Blights

- **Pathogens**
 - *Pythium* spp.
 - *Rhizoctonia solani*
 - *Fusarium* spp.
- **Hosts:** Seedlings of virtually anything
- **Environmental trigger:** Cool, wet soils



Diseases of Greenhouse Crops Damping-Off/Seedling Blights

- **Control**
 - Use a pasteurized soil mixture
 - Use decontaminated pots, working surfaces and tools
 - Moderate soil moisture
 - Use a soil with adequate drainage
 - DO NOT overwater

Diseases of Greenhouse Crops Damping-Off/Seedling Blights

- **Control**
 - Germinate seeds at higher temperatures
 - Use fungicides/biological control products to protect seedlings
 - Etridiazole, metalaxyl, mefenoxam, captan
 - *Trichoderma* spp., *Gliocladium* spp., *Streptomyces* spp., *Pseudomonas* spp., *Bacillus* spp.
 - Applied as a seed treatment or soil treatment

Diseases of Greenhouse Crops Root/Crown Rots

- **Pathogens**
 - *Pythium* spp.
 - *Phytophthora* spp.
 - *Rhizoctonia solani*
 - *Fusarium* spp.
 - *Cylindrocarpum* spp.
 - *Thielaviopsis* spp.
- **Hosts:** Anything and everything
- **Environmental trigger:** Cool, wet soils



Diseases of Greenhouse Crops Root/Crown Rots

- **Control**
 - Use a soil-less potting mix
 - Pretest soils/mulches/composts for the presence of root rot fungi
 - Moderate soil moisture
 - Use a soil/potting mix with adequate drainage
 - Improve drainage in poorly drained soils/potting mixes
 - DO NOT overwater

Diseases of Greenhouse Crops Root/Crown Rots

- **Control**
 - Decontaminate infested tools, pots, work areas
 - Decontaminate recycled water
 - Filtration
 - Irradiation
 - Chemical treatment

Diseases of Greenhouse Crops Root/Crown Rots

- **Control**
 - Use fungicides to prevent infections
 - Etridiazole, metalaxyl, mefenoxam, fosetyl-AI
 - PCNB, thiophanate-methyl, fludioxonil
 - Spray applications or soil drenches
 - Alternate active ingredients (FRAC Codes)
 - Use biopesticides to prevent infections
 - *Trichoderma* spp., *Gliocladium* spp.
 - Incorporated into potting mixes

Diseases of Greenhouse Crops Powdery Mildews

- **Causes**
 - *Erysiphe* spp.
 - *Uncinula* spp.
 - *Phyllactinia* spp.
 - *Blumeria* spp.
 - *Oidium* spp.
 - *Microsphaera* spp.
 - *Sphaerotheca* spp.
 - *Podosphaera* spp.
 - *Brasiliomyces* spp.
 - *Ovulariopsis* spp.
- **Hosts:** Virtually everything
- **Environmental trigger:** High humidity



Diseases of Greenhouse Crops Powdery Mildews

- **Control**
 - Remove diseased plant material and debris
 - Reduce humidity
 - Space plants farther apart
 - Increase air flow
 - Grow resistant cultivars/varieties

Diseases of Greenhouse Crops Powdery Mildews

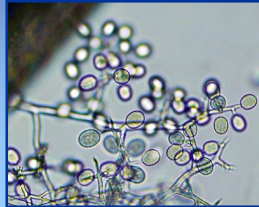
- **Control**
 - Use fungicides to prevent infections
 - Dinocap, dithiocarbamates, myclobutanil, triadimefon, triforine, sulfur or thiophanate-methyl
 - Baking soda (1.5 Tbsp/gal) and light-weight horticultural oil (3 Tbsp/gal)
 - Apply when humidity >60-70%
 - Alternate active ingredients (FRAC Codes)
 - 7-14 day application interval

Diseases of Greenhouse Crops Impatiens Downy Mildew

- **Causes**
 - Plasmopara obducens
 - Bremiella sphaerosperma
- **Hosts**
 - Standard garden impatiens (I. walleriana)
 - Balsam impatiens (I. balsamina)
 - Jewelweed (I. pallida, I. capensis)
 - New Guinea impatiens (I. hawkeri) (resistant/tolerant)

Diseases of Greenhouse Crops *Impatiens Downy Mildew*

- **Environment trigger**
 - Cool conditions (59 - 73°F)
 - Long leaf wetness periods (> 6 hrs)
 - High humidity



Diseases of Greenhouse Crops *Impatiens Downy Mildew*

- **Control**
 - Grow immune/resistant/tolerant species
 - Start with clean seed and transplants
 - Move (i.e., rotate) impatiens production
 - Keep materials from different sources physically separated
 - DO NOT overcrowd plants
 - DO NOT overhead water

Diseases of Greenhouse Crops *Impatiens Downy Mildew*

- **Control**
 - Scout frequently
 - Bag and discard affected plants
 - Symptomatic plants
 - Asymptomatic surrounding plants
 - Disinfest contaminated areas
 - Commercial disinfectants
 - 10% bleach
 - 70% alcohol

Diseases of Greenhouse Crops *Impatiens Downy Mildew*

- **Control**
 - Use fungicides to prevent infections
 - mefenoxam, fluopicolide, potassium phosphite, mancozeb, pyraclostrobin + boscalid, fluoxastobin, cyazofamid, dimethomorph, fenamidone, azoxystrobin
 - Alternate active ingredients (FRAC Codes)
 - Apply at 7 day application intervals

Diseases of Greenhouse Crops Viral Diseases

- **Pathogens**
 - Many with more discovered all the time
 - Wide-range
 - Impatiens necrotic spot virus (INSV)
 - Tomato spotted wilt virus (TSWV)
 - Tobacco mosaic virus (TMV)
 - Cucumber mosaic virus (CMV)
 - Tobacco rattle virus (TRV)

Diseases of Greenhouse Crops Viral Diseases

- **Pathogens**
 - Narrow-range
 - Cymbidium mosaic virus (CyMV)
 - Odontoglossum ringspot virus (ORSV)
 - Hosta virus X (HVX)
- **Environmental trigger: None**
- **Transmission: Insect, mechanical, seed**



Diseases of Greenhouse Crops Viral Diseases

- **Control**
 - Buy plants from a reputable source
 - Inspect plants prior to purchase for disease
 - Test plants prior to purchase (Agdia, Inc. – www.agdia.com)
 - DO NOT smoke around plants
 - Control insect vectors
 - Isolate infected plants/remove plant debris

Diseases of Greenhouse Crops Viral Diseases

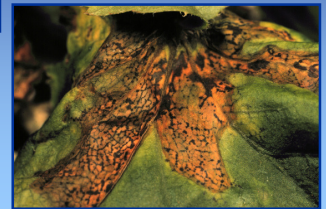
- **Control**
 - Remove weed hosts
 - Disinfest contaminated materials
 - Sodium dodecyl sulfate (sodium lauryl sulfate) + Alconox® (1% + 1%)
 - Trisodium phosphate
 - Alcohol dip followed by flaming
 - Wash hands, particularly if you smoke
 - Decontaminate recycled water

Diseases of Greenhouse Crops Viral Diseases

- **Control**
 - NO Chemical control

Diseases of Greenhouse Crops Xanthomonas Leaf Diseases

- **Cause:** *Xanthomonas campestris*
 - pv. poinsettiicola
 - pv. begoniae
 - pv. pelargonii
 - pv. hederae
 - pv. dieffenbachiae
- **Hosts:** Varied depending on pathovar
- **Environmental Trigger:** High moisture



Diseases of Greenhouse Crops Xanthomonas Leaf Diseases

- **Control**
 - Start with clean propagation materials
 - Follow strict sanitation procedures when working with plant materials
 - Remove symptomatic plants
 - Remove contaminated plant debris
 - Disinfest greenhouses after production

Diseases of Greenhouse Crops Ralstonia Wilt

- **Cause:** *Ralstonia solanacearum*
 - races
 - biovars
- **Hosts**
 - Geranium
 - Many other herbaceous plants
 - Potato
- **Environmental trigger:** Warm weather



Diseases of Greenhouse Crops *Ralstonia Wilt*

- **Control**
 - Start with clean propagation materials
 - Follow strict sanitation procedures when working with plant materials
 - Keep plants from different sources separated
 - Disinfect pruning tools
 - Disinfect hands when working with plants

Diseases of Greenhouse Crops *Ralstonia Wilt*

- **Control**
 - If you suspect you have the disease, contact the PDDC/WI DATCP
 - Confirm the disease
 - Remove symptomatic plants
 - Remove co-mingled plants
 - Remove contaminated plant debris
 - Disinfest greenhouses after production

Diseases of Greenhouse Crops *Foliar Nematodes*

- **Cause:** *Aphelenchoides* spp.
- **Hosts**
 - Wide host range
 - Houseplants: African violets, ferns, begonia, chrysanthemum
 - Landscape plants: Hosta, coral bells
- **Environmental trigger:** Rain

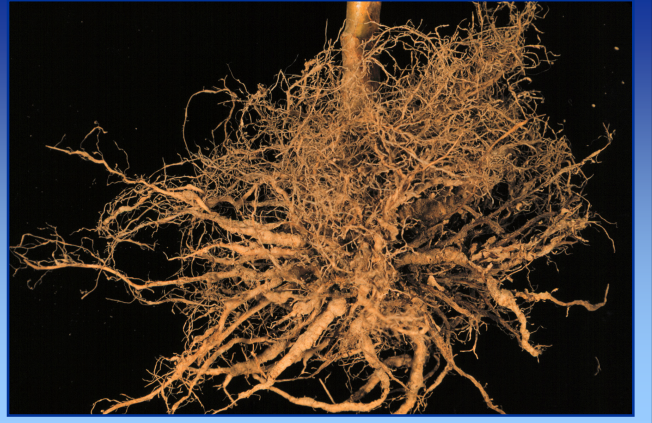


Diseases of Greenhouse Crops *Foliar Nematodes*

- **Control**
 - Start with clean propagation materials
 - Follow strict sanitation procedures when working with plant materials
 - Remove symptomatic plants
 - Remove contaminated plant debris
 - Avoid overhead irrigation
 - Hot water treatments (10 minutes at 125°F)

Diseases of Greenhouse Crops Root Knot Nematodes

- Cause: Meloidogyne spp.
- Hosts
 - Many ornamentals
 - Tomato
- Environmental trigger: None

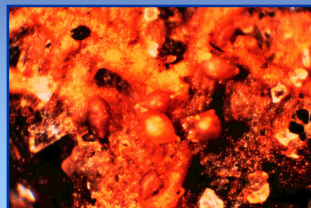


Diseases of Greenhouse Crops Root Knot Nematodes

- Control
 - Start with clean materials
 - Grow resistant varieties (N)
 - Use soil-less growing media or pasteurized soil
 - Discard infected plants

Diseases of Greenhouse Crops Cyst Nematodes

- Cause: Heterodera spp.
(Cystus cyst nematode)
- Hosts
 - Cacti
 - Other succulents
- Environmental trigger: None



Diseases of Greenhouse Crops Cyst Nematodes

- Control
 - Start with clean materials
 - Use soil-less growing media or pasteurized soil
 - Discard infected plants

Diseases of Greenhouse Crops Disease Control

- **Resistance**
- **Exclusion**
- **Protection**
- **Eradication**
- **Avoidance**
- **Therapy**

Diseases of Greenhouse Crops Disease Control

- **Resistance**
 - Use resistant varieties
 - Use tolerant varieties

Diseases of Greenhouse Crops Disease Control

- **Exclusion**
 - Buy seed from a reputable source
 - Buy healthy transplants
 - Control insect pests
 - Use non-contaminated water
 - Disinfest, disinfest, disinfest

Diseases of Greenhouse Crops Disease Control

- **Protection**
 - Use chemical control products
 - Synthetic compounds
 - “Organic” compounds (sulfur, copper, bicarbonate)
 - Use biological control products
 - Bacteria (*Pseudomonas*, *Bacillus*, *Streptomyces*)
 - Fungi (*Trichoderma*, *Gliosporium*, *Coniothyrium*)
 - Plant Extracts (Neem oil)

Diseases of Greenhouse Crops Disease Control

- **Protection**
 - Use registered/labeled materials only
 - Use products safely
 - Get training

Diseases of Greenhouse Crops Disease Control

- **Eradication**
 - Properly dispose of old plant debris
 - Remove diseased plants promptly
 - Control weeds
 - Adequately clean pots, tools, etc.
 - Pasteurize soil prior to use
 - Decontaminate recycled water

Diseases of Greenhouse Crops Disease Control

- **Avoidance**
 - *Moderate soil moisture*
 - *DO NOT overhead water if possible*
 - *Adjust plant spacing to reduce humidity*
 - *Have balanced nutrition*
 - *Prevent water/heat stress*
 - *Remove senescent plant parts promptly*

Diseases of Greenhouse Crops Disease Control

- **Therapy**
 - *Hot water treatments*
 - *Whole plants*
 - *Seeds*
- <http://www.hort.uconn.edu/IPM/homegrnd/htms/54sedtrt.htm>
- **Chemical treatments**

Diseases of Greenhouse Crops 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@plantpath.wisc.edu
<http://pddc.wisc.edu>
Follow the clinic on Twitter @UWPDDC*