Diseases of Greenhouse Crops

Horticulture 334

Diseases of Greenhouse Crops

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Damping-Off/Seedling Blights

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

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

Damping-Off/Seedling Blights

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

Root/Crown Rots

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

**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
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Powdery Mildews

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

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Powdery Mildews

- 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)

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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)
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**Impatiens Downy Mildew**

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

**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

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

**Environmental trigger**: None

**Transmission**: Insect, mechanical, seed

**Control**

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

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**Pathogens**

- **Narrow-range**
  - Cymbidium mosaic virus (CyMV)
  - Odontoglossum ringspot virus (ORSV)
  - Hosta virus X (HVX)

**Control**

- Remove weed hosts
- Disinfest contaminated materials
  - 1% Sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2¼ Tbsp + 2½ Tbsp/gal)
  - 20% low fat dry milk (Carnation®) + 0.1% polysorbate 20 (9⅛ cups + ¾ tsp/gal)
  - Trisodium phosphate (14 dry oz/gal)
  - Alcohol dip followed by flaming
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**Viral Diseases**

- **Control**
  - Wash hands, particularly if you smoke
  - Decontaminate recycled water
  - NO Chemical control

**Xanthomonas Leaf Diseases**

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

**Ralstonia Wilt**

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

• Cause: Aphelenchoides spp.

• Hosts
  – Wide host range
  – Houseplants: African violets, ferns, begonia, chrysanthemum
  – Landscape plants: Hosta, coral bells

• Environmental trigger: Rain

Foliar Nematodes

• Control
  – Start with clean propagation materials
  – Follow strict sanitation procedures when working with plant materials
  – Remove symptomatic plants
  – Remove co-mingled plants
  – Remove contaminated plant debris
  – Disinfect greenhouses after production
  – Avoid overhead irrigation
  – Hot water treatments (10 minutes at 125°F)
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**Root Knot Nematodes**

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

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

**Cyst Nematodes**

- **Cause:** *Cactodera* spp. (Cactus cyst nematode)
- **Hosts**
  - Cacti
  - Other succulents
- **Environmental trigger:** None

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

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

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Disease Control

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

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Disease Control

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

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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)

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Disease Control

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

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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
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**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

- **Therapy**
  - Hot water treatments
    - Whole plants
    - Seeds
    - “Hot-Water Seed Treatment for Disease Management”
      - [Link](http://pddc.wisc.edu/fact-sheet-listing-all/)
  - Chemical treatments

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**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
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