

Clark County Spring Garden Conference

Double Trouble: Diseases in the Vegetable and Herbaceous Ornamental Garden

Brian D. Hudelson

Department of Plant Pathology

University of Wisconsin-Madison/Extension



Double Trouble Powdery Mildews

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



Double Trouble Powdery Mildews

- Control
 - Remove and destroy plant debris
 - Burn (where allowed)
 - Deep bury
 - Hot compost
 - Reduce humidity
 - Plant less densely/thin existing stands
 - Grow vining plants on a trellis
 - Use resistant cultivars/varieties

Double Trouble Powdery Mildews

- Control
 - Use fungicides to prevent infections
 - Dithiocarbamates, myclobutanil, propiconazole, tebuconazole, thiophanate-methyl
 - Sulfur, neem oil, other plant-based oils
 - 1.5 Tbsp baking soda + 3 Tbsp light-weight horticultural oil in 1 gal water
 - Alternate active ingredients (FRAC codes)
 - Apply when humidity is >60-70%
 - Apply every 7-14 days

Double Trouble Fungal Leaf Blights

- **Pathogens**
 - Tomato, potato
 - *Alternaria solani* (early blight)
 - *Phytophthora infestans* (late blight)
 - Tomato
 - *Septoria lycopersici* (Septoria leaf spot)
 - Black-eyed Susan (*Rudbeckia*)
 - *Septoria rudbeckiae* (Septoria leaf spot)
- **Favorable environment:** Cool, wet weather



Double Trouble Fungal Leaf Blights

- **Control (early blight, Septoria leaf spot)**
 - Remove and destroy contaminated debris
 - Burn (where allowed)
 - Deep bury
 - Hot compost
 - Move plants to new location (i.e., rotate)
 - Avoid susceptible *Rudbeckia* varieties
 - Space plants far apart

Double Trouble Fungal Leaf Blights

- **Control (early blight, Septoria leaf spot)**
 - Mulch around the base of plants
 - DO NOT overmulch
 - DO NOT overhead water
 - Remove infected leaves
 - Use fungicides to prevent infections
 - Chlorothalonil, mancozeb, copper
 - Alternate active ingredients (FRAC codes)
 - Apply at 7-14 day intervals

Double Trouble Fungal Leaf Blights

- **Control (late blight)**
 - Remove any infected plants and plant parts
 - Infected tomato/potato plants including fruits and tubers
 - Volunteer tomato and potato plants
 - Weed hosts
 - Destroy any infected plants and plant parts
 - Burn (where allowed)
 - Double bag and landfill

Double Trouble Fungal Leaf Blights

- Control (late blight)
 - DO NOT use last year's potatoes as seed
 - DO use certified seed potatoes
 - Grow resistant tomato varieties
 - "Late Blight Management in Tomato with Resistant Varieties"
(<https://eorganic.org/node/10822>)

Double Trouble Fungal Leaf Blights

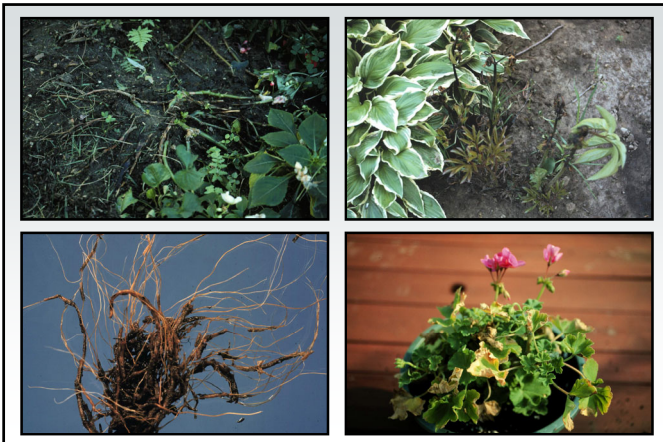
- Control (late blight)
 - Use fungicides to prevent infections
 - Chlorothalonil, mancozeb, copper
 - Alternate active ingredients (FRAC codes)
 - Start applications based on Blitecast
(<https://wisconsinpotatoes.com/blog-news/>)
 - Apply at 7-14 day intervals

Double Trouble Root Rots

- Pathogens
 - *Pythium* spp. (Pythium root rot)
 - *Phytophthora* spp. (Phytophthora root rot)
 - *Rhizoctonia solani* (Rhizoctonia root rot)
 - *Fusarium* spp. (Fusarium root rot)
 - *Thielaviopsis basicola* (black root rot)
 - *Aphanomyces euteiches*
(Aphanomyces root rot)

Double Trouble Root Rots

- Hosts
 - Anything and everything
 - Vegetables: beans, peas, carrots
- Favorable environment: Wet, cool soils



Double Trouble Root Rots

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

Double Trouble Root Rots

- **Control**
 - Pretest soils/mulches/composts
 - Use a soil-less potting mix or pasteurized potting mixes for containerized plants
 - Rotate vegetables (and ornamentals) whenever possible
 - DO NOT move contaminated soil or plants

Double Trouble Root Rots

- **Control**
 - Decontaminate tools, pots, work areas
 - 70% alcohol
 - Commercial disinfectants
 - 0.5% sodium hypochlorite (bleach)
 - Use biopesticides to prevent infections
 - *Trichoderma*, *Gliocladium* (in potting mix)
 - *Streptomyces lydicus*
 - Apply at seeding
 - Apply every 7-14 days after emergence

Double Trouble Root Rots

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

Double Trouble Aster Yellows

- **Pathogen:** Aster yellows phytoplasma
- **Hosts**
 - Many plants in the aster family
 - Many other plants in many other families
 - Vegetables: carrots, potatoes
- **Favorable environment:** None
- **Transmission:** Aster leafhopper





Double Trouble Aster Yellows

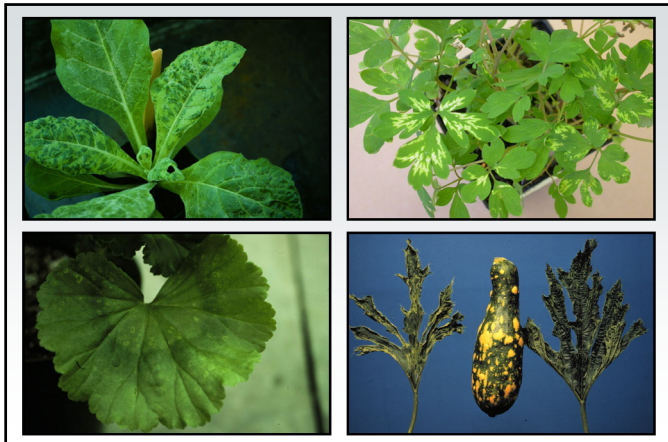
- **Control**
 - Remove diseased plant material and debris
 - Hot compost
 - Bury
 - Burn (where allowed)
 - Control leafhopper vector (?)

Double Trouble Virus Diseases

- **Pathogens**
 - Many and varied
 - *Tobacco mosaic virus (TMV)*
 - *Cucumber mosaic virus (CMV)*
 - *Impatiens necrotic spot virus (INSV)*
 - *Tobacco rattle virus (TRV)*
 - *Hosta virus X (HVX)*
- **Hosts: Many ornamentals and vegetables**

Double Trouble Virus Diseases

- **Favorable environment: None**
- **Transmission**
 - Touch (TMV)
 - Mechanical injury (HVX)
 - Insects (CMV, INSV)
 - Nematodes (TRV)
 - Grafting
 - Seed



Double Trouble Virus Diseases

- **Control**
 - Buy plants from a reputable source
 - Inspect plants for viral symptoms
 - Test plants for viruses (Agdia, Inc.: <https://www.agdia.com>)
 - DO NOT buy symptomatic plants
 - Use resistant/tolerant varieties
 - Keep weeds under control

Double Trouble Virus Diseases

- **Control**
 - Control insects (e.g., aphids, thrips)
 - DO NOT smoke around your plants
 - Remove and destroy infected plants
 - Burn (where allowed)
 - Deep bury/landfill
 - Hot compost
 - Technique depends on the virus
 - Wash hands routinely with soap and water

Double Trouble Virus Diseases

- **Control**
 - Disinfest contaminated materials
 - 1% sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¼ Tbsp/gal)
 - Trisodium phosphate (14 dry oz/gal)
 - Alcohol dip following by flaming
 - DO NOT use chemical controls on plants

Double Trouble Southern Blight

- **Pathogen:** *Sclerotium rolfsii*
- **Hosts**
 - Most herbaceous annuals
 - Most vegetables
 - Some woody ornamentals
- **Favorable environment**
 - Warm soil temperatures
 - Wet soils



Double Trouble Southern Blight

- **Control**
 - DO NOT buy infected/infested plants
 - Avoid cocoa mulch (?)
 - Remove infected plants, mulch, and soil
 - Double bag
 - Landfill

Double Trouble Southern Blight

- **Control**
 - Disinfect contaminated materials
 - 70% alcohol
 - Commercial disinfectants
 - 0.5% sodium hypochlorite (bleach)
 - Amend soil with organic matter (?)

Double Trouble Southern Blight

- **Control**
 - 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 really, really, REALLY cold winters

Double Trouble Verticillium Wilt

- **Pathogens**
 - *Verticillium dahliae*
 - *Verticillium albo-atrum*
 - Other *Verticillium* species
- **Hosts**
 - Many herbaceous plants
 - Many vegetables
 - Many woody ornamentals

Double Trouble Verticillium Wilt

- **Favorable environment**
 - Cool, wet weather (for infection)
 - Hot, dry weather (for symptom development)



Double Trouble Verticillium Wilt

- Control
 - Avoid *Verticillium*-infested areas
 - Pretest soils/mulches/composts for *Verticillium*
 - Fumigate heavily infested soils
 - Keep broad-leaf weeds under control
 - Avoid municipal mulches

Double Trouble Verticillium Wilt

- Control
 - Use immune/resistant plants
 - CONIFERS: Pines, spruces, firs, junipers
 - DECIDUOUS TREES/SHRUBS: Beech, birch, ginkgo, hackberry, hawthorn, hickory, honey locust, mountain ash, white oak, bur oak, poplar, serviceberry, sycamore, willow
 - HERBACEOUS ORNAMENTALS: Grasses
 - VEGETABLES: Bean, carrot, corn, pea, tomato (V)

Double Trouble Verticillium Wilt

- Control
 - Prevent plant stress
 - Prune disease (wilted) areas
 - Decontaminate pruning tools
 - 70% alcohol
 - Commercial disinfectants
 - 0.5% sodium hypochlorite (bleach)

Double Trouble Verticillium Wilt

- Control
 - Make plants comfortable until they die
 - Remove diseased plants
 - Destroy infested plant materials
 - Burn (where allowed)
 - Hot compost (?)
 - DO NOT bury

Double Trouble Herbicide Injury

- Causes
 - Growth regulator herbicides
 - 2,4-D
 - Dicamba
 - Other herbicides
- Affected plants: Anything and everything





Double Trouble Herbicide Injury

- **Management**
 - **DO NOT** use herbicides
 - If you or your neighbors do use herbicides, make sure that you or they
 - Follow application directions exactly
 - Apply herbicides at low wind speeds (< 5 mph)
 - **DO NOT** apply herbicides too close to sensitive plants
 - Apply herbicides at low pressure
 - Use amine rather than ester forms of herbicides

Double Trouble 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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