Talks for the General Public

Double Trouble: Diseases in the Vegetable and Herbaceous Ornamental Garden

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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

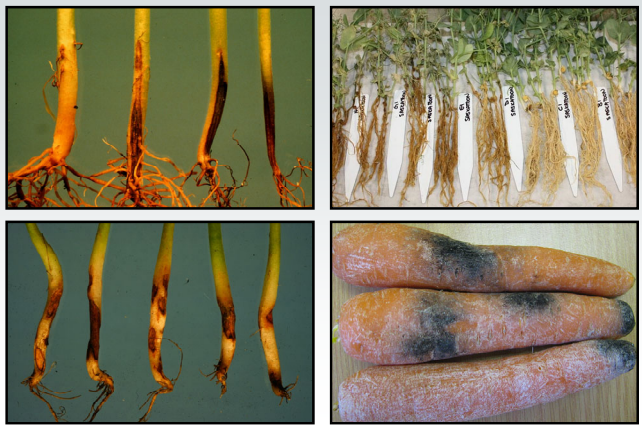
- Control (late blight)
  - Use fungicides to prevent infections
    - Chlorothalonil, mancozeb, copper
    - Alternate active ingredients (FRAC codes)
    - Start applications based on Blitecast (https://wisconsinpotatoes.com/blog-news/)
    - Apply at 7-14 day intervals

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-Al, 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 + 2¾ 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
  - Disinfest 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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