Arlington Ag. Research Station Seminar

Double Trouble: Diseases in the Vegetable and Herbaceous Ornamental Garden

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Vegetable/Herbaceous Ornamental Diseases
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*
- *Favorable environment: High humidity*

Vegetable/Herbaceous Ornamental Diseases
Powdery Mildews

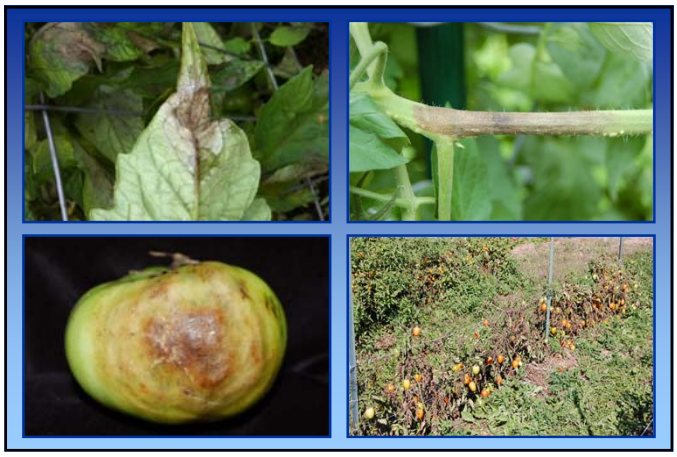
- *Control*
  - *Remove and destroy plant debris*
    - *Burn (where allowed)*
    - *Deep bury*
    - *Hot compost*
  - *Reduce humidity*
    - *Plant less densely*
    - *Thin existing stands*
  - *Use resistant cultivars/varieties*

Vegetable/Herbaceous Ornamental Diseases
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 code)*
    - *Apply when humidity >60-70%*
    - *Apply at 7-14 day intervals*

Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

- Causes
  - 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: Wet weather



Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

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

Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

- Control (early blight, Septoria leaf spots)
  - 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 code)
    - Apply at 7-14 day intervals

Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

- Control (late blight)
  - Remove and destroy
    - Infected plants, fruits, tubers
    - Volunteer tomato and potato plants
    - Weed hosts
  - DO NOT use last year's potatoes as seed potatoes
  - DO use certified seed potatoes

Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

- Control (late blight)
  - Grow resistant tomato varieties
    - "Late Blight Management in Tomato with Resistant Varieties" http://www.extension.org/pages/72678/late-blight-management-in-tomato-with-resistant-varieties#.VVNSsPlVhBd

Vegetable/Herbaceous Ornamental Diseases
Fungal Leaf Blights

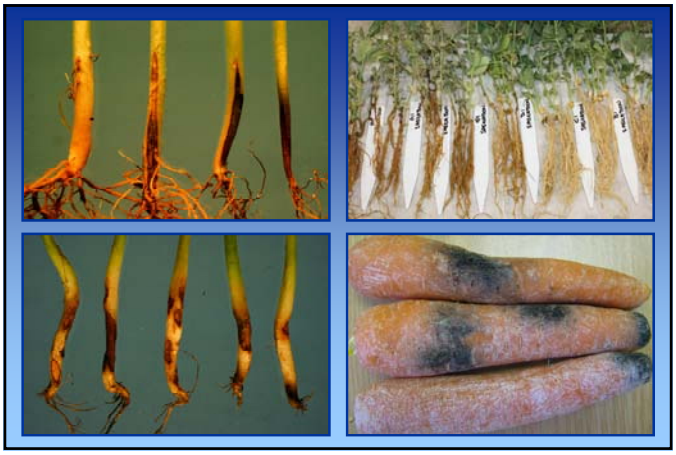
- Control (late blight)
  - Use fungicides to prevent infections
    - Chlorothalonil, mancozeb, copper
    - Alternate active ingredients (FRAC code)
    - Start applications based on Blitecast (http://www.plantpath.wisc.edu/wivegdis/)
    - Apply at 7-14 day intervals

Vegetable/Herbaceous Ornamental Diseases
Root Rots

- Causes
  - *Pythium* spp.
  - *Phytophthora* spp.
  - *Rhizoctonia solani*
  - *Fusarium* spp.
  - *Cylindrocarpon* spp.
  - *Thielaviopsis* spp.
  - *Aphanomyces euteiches*

Vegetable/Herbaceous Ornamental Diseases
Root Rots

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



Vegetable/Herbaceous Ornamental Diseases
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

Vegetable/Herbaceous Ornamental Diseases
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
  - Use a soil-less potting mixes

Vegetable/Herbaceous Ornamental Diseases
Root Rots

- Control
  - Decontaminate tools, pots, work areas
    - 70% alcohol
    - 10% bleach
    - Commercial disinfectants
  - Use biopesticides to prevent infections
    - *Trichoderma*, *Gliocladium*
    - Use in pot production

Vegetable/Herbaceous Ornamental Diseases
Root 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

Vegetable/Herbaceous Ornamental Diseases
Aster Yellows

- Cause: Aster yellows phytoplasma
- Hosts
  - Many plants in the aster family
  - Many other plants in many other plant families
  - Vegetables: carrots, potatoes
- Favorable environment: None
- Transmission: Leafhoppers

Vegetable/Herbaceous Ornamental Diseases
Aster Yellows

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

Vegetable/Herbaceous Ornamental Diseases
Virus Diseases

- Causes
  - 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

Vegetable/Herbaceous Ornamental Diseases
Virus Diseases

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

Vegetable/Herbaceous Ornamental Diseases
Virus Diseases

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

Vegetable/Herbaceous Ornamental Diseases
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

Vegetable/Herbaceous Ornamental Diseases
Virus Diseases

- Control
  - Disinfest contaminated materials
    - 1% sodium dodecyl sulfate (sodium lauryl sulfate) + 1% Alconox® (2½ Tbsp + 2¾ 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
  - DO NOT use chemical controls on plants

Vegetable/Herbaceous Ornamental Diseases
Southern Blight

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

Vegetable/Herbaceous Ornamental Diseases
Southern Blight

- Control
  - DO NOT buy infected/infested plants
  - Avoid cocoa mulch (?)
  - Remove infected plants, mulch and soil
    - Double bag
    - Landfill
  - Disinfest contaminated materials
    - 70% alcohol
    - Commercial disinfectants
    - 10% bleach

Vegetable/Herbaceous Ornamental Diseases
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 14 – 28 day intervals
  - Pray for a really, really, REALLY cold winter

Vegetable/Herbaceous Ornamental Diseases
Verticillium Wilt

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

Vegetable/Herbaceous Ornamental Diseases
Verticillium Wilt

- Favorable environment
  - Cool, wet weather
  - Hot, dry weather thereafter

Vegetable/Herbaceous Ornamental Diseases
Verticillium Wilt

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

Vegetable/Herbaceous Ornamental Diseases
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)

Vegetable/Herbaceous Ornamental Diseases
Verticillium Wilt

- Control
  - Prevent plant stress
  - Prune diseased (wilted) areas
  - Decontaminate pruning tools
    - 70% alcohol
    - 10% bleach
    - Commercial disinfectants

Vegetable/Herbaceous Ornamental Diseases
Verticillium Wilt

- Control
  - Make plants comfortable until they die
  - Remove diseased plants
  - Remove and destroy infected plants
    - Burn (where allowed)
    - Hot compost (?)
    - DO NOT bury

Vegetable/Herbaceous Ornamental Diseases
Herbicide Injury

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

Vegetable/Herbaceous Ornamental Diseases
Herbicide Injury

- Control
  - 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

Vegetable/Herbaceous Ornamental Diseases
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
http://pddc.wisc.edu
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