Vegetable Diseases

Damping-Off/Seedling Blights

• Causes
  – Pythium spp.
  – Rhizoctonia solani
  – Fusarium spp.
• Hosts: Any vegetable
• Favorable environment
  – Cool soil temperatures
  – Wet soils

• Control
  – Use a pasteurized soil mixture
  – Use decontaminated pots, working surfaces and tools
    • 10% bleach
    • 70% alcohol
    • Commercial disinfectants

• Control
  – Moderate soil moisture
  • Use a soil with adequate drainage
  • DO NOT over-water
  – Germinate seeds at higher temperatures

• Control
  – Use fungicides to protect seedlings
    • Captan
    • Streptomyces lydicus
    • Trichoderma spp., Gliocladium spp., Pseudomonas spp., Bacillus spp.
  • Apply as a seed treatment or drench
Vegetable Diseases
Fungal Leaf Blights

• Causes
  – *Septoria lycopersici* (Septoria leaf spot)
  – *Alternaria solani* (early blight)
  – *Phytophthora infestans* (late blight)

• Hosts
  – Tomato
  – Potato (early blight, late blight)

• Favorable environment: Cool, wet weather

Vegetable Diseases
Fungal Leaf Blights

• Control (early blight, Septoria leaf spot)
  – Remove and destroy infested debris (burn, bury, hot compost)
  – Move tomatoes to new location (?)
  – Plant resistant varieties (?)
  – Space plants far apart
  – Mulch around the base of plants
  – DO NOT over-mulch

Vegetable 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 Diseases
Fungal Leaf Blights

• Control (early blight, Septoria leaf spot)
  – DO NOT overhead water
  – Remove infected leaf tissue (?)
  – Use fungicides to prevent infections
    • Chlorothalonil, mancozeb
    • Copper
    • Alternate active ingredients (FRAC codes)
  – Apply at 7-14 days intervals
Vegetable Diseases
Fungal Leaf Blights

• Control (late blight)
  – Grow resistant tomato varieties
  • “Late Blight Management in Tomato with Resistant Varieties”

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

Vegetable Diseases
Bacterial Tomato Diseases

• Causes
  – Pseudomonas syringae pv. tomato (bacterial speck)
  – Xanthomonas spp. (bacterial spot)
• Host: Tomato
• Favorable environment
  – Cool, wet weather (bacterial speck)
  – Warm, wet weather (bacterial spot)

• Control
  – Dispose of contaminated plant debris (burn, bury, hot compost)
  – Remove and destroy volunteer tomatoes
  – Start with pathogen-free seeds and plants
  – Hot water treat seeds (122°F, 25 minutes)
  – Move tomatoes to new location
  – Space plants far apart

• Control
  – Mulch around the base of plants
  – DO NOT over-mulch
  – DO NOT overhead water
  – DO NOT handle plants when wet
  – Use bactericides to prevent infections
    • Copper
    • Apply at 7-14 days intervals
    • Tolerant bacterial strains are a problem
Vegetable Diseases

Blossom End Rot

• Cause: Calcium deficiency

• Affected plants
  – Tomato
  – Pepper
  – Eggplant
  – Cucurbits (cucumber, squash, pumpkin)

• Favorable Environment: Drought

Vegetable Diseases

Blossom End Rot

• Management
  – Test soil to determine calcium level
  – Add calcium as needed
    • Bone meal
    • Egg shells
    • NOT lime (usually)
  – Water plants adequately and uniformly

Vegetable Diseases

Vascular Wilts

• Causes
  – Verticillium spp. (Verticillium wilt)
  – Fusarium oxysporum (Fusarium wilt)

• Hosts
  – Solanaceous vegetables
    (tomato, potato, pepper, eggplant)
  – Cucurbits (pumpkin, squash, cucumber)

• Favorable environment: Wet/dry weather

Vegetable Diseases

Vascular Wilts

• Control
  – Rotate crops to avoid pathogen build-up
    • DO NOT plant susceptible vegetables in infested areas
    • Plant non-hosts in infested areas
  – Plant resistant varieties (VFF)
  – DO NOT over-water
  – DO NOT over-mulch
  – DO NOT use fungicides or biological controls
Vegetable Diseases

**Walnut Toxicity**

- **Cause:** Juglones
  - Black walnut
  - Butternut
  - Hickory
- **Affected plants**
  - Many vegetables
  - Asparagus, cabbage
  - Tomato, potato, pepper, eggplant

**Management**
- DO NOT plant sensitive vegetables near walnut trees
- Plant tolerant vegetables
  - Beans
  - Corn
  - Parsnip
  - Plant sensitive vegetables
    - in raised beds
    - in pots
  - Beet
  - Melon
  - Squash
  - Carrot
  - Onion

- Keep walnut leaves and fruits out of your garden
- DO NOT compost walnut leaves and fruits
- Remove volunteer walnut trees
- Remove mature walnut trees (?)

**Herbicide Injury**

- **Causes**
  - Growth regulator herbicides
    - 2,4-D
    - Dicamba
  - Other herbicides
- **Affected plants**
  - All vegetables
  - Tomatoes
**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

**Powdery Mildew**

- **Causes**
  - Miscellaneous powdery mildew fungi
    - Oidium spp.
- **Hosts**
  - Cucurbits (cucumber, squash, pumpkin)
  - Other vegetables (pea, tomato)
- **Favorable environment:** High humidity

**Powdery Mildew**

- **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

**Powdery Mildew**

- **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

**Downy Mildew**

- **Causes**
  - Pseudoperonospora cubensis
  - Peronospora belbahrii
- **Hosts**
  - Cucurbits (cucumber, squash, pumpkin)
  - Basil
Vegetable Diseases
Downy Mildew

• Favorable environment
  – High moisture
  – High humidity
  – Moderate/warm temperatures

• Control
  – Start with clean seed and transplants
  – Grow less susceptible/resistant varieties
  • Red varieties of basil
  • Sweet basil ‘Eleonora’
  • Certain cucumber and cantaloupe varieties with lesser success for squash and pumpkin varieties
  – DO NOT overcrowd plants
  – DO NOT overhead water

Vegetable Diseases
Bacterial Wilt

• Cause: *Erwinia tracheiphila*
• Hosts: Cucurbits  
  (cucumber, squash, pumpkin)
• Favorable environment: None
• Transmission: Cucumber beetles
**Vegetable Diseases**

**Bacterial Wilt**

- **Control**
  - Use floating row covers
  - Apply insecticides to control cucumber beetles
  - Remove infected plants
  - If you decide to keep infected plants, water them adequately
  - DO NOT use bactericides or biological controls

**Cucumber Mosaic**

- **Cause:** Cucumber mosaic virus
- **Hosts**
  - Cucurbits
  - Pepper
  - Tomato
  - Other vegetables
- **Favorable environment:** None
- **Transmission:** Aphids

**Vegetable Diseases**

**Common Scab**

- **Cause:** Streptomyces scabies
- **Hosts**
  - Potato
  - Carrot
  - Other root crops
- **Favorable environment:** High soil pH
Vegetable Diseases

Common Scab

- **Control**
  - Plant scab-free potato stock
  - Routinely rotate crops
    - DO NOT grow host plants in infested areas
    - Plant non-hosts in infested areas
  - Move potatoes to another location
  - Plant scab resistant varieties
  - Lower soil pH
  - DO NOT use chemical or biological controls

Vegetable Diseases

Bacterial Soft Rot

- **Cause:** *Pectobacterium carotovorum*
- **Hosts**
  - Potato
  - Carrot
  - Other vegetables
- **Favorable environment**
  - Wet soils
  - Wet storage conditions

Vegetable Diseases

Bacterial Soft Rot

- **Control**
  - Moderate soil moisture
  - DO NOT overhead irrigate
  - Have good soil fertility (particularly calcium)
  - Harvest vegetables (potatoes) promptly
  - DO NOT bruise/injure vegetables
  - Keep harvested vegetables dry
  - Remove any rotted vegetables immediately

Vegetable Diseases

Black Rot

- **Cause:** *Xanthomonas campestris pv. campestris*
- **Hosts:** Crucifers
  - Brussels sprouts, cabbage, collards
  - Broccoli, cauliflower, kale, kohlrabi, rutabaga, turnips
- **Favorable environment:** Wet weather
Vegetable Diseases

**Black Rot**

- **Control**
  - Buy high quality (certified pathogen-free) seed or transplants
  - Heat treat seeds
    - 35 min, 122°F (Brussels sprouts, cabbage, collards)
    - 20 min, 122°F (broccoli, cauliflower, kale, kohlrabi, rutabaga, turnips)

Vegetable Diseases

**Black Rot**

- **Control**
  - Routinely rotate crops
  - DO NOT grow host plants in an infested areas
  - Plant non-hosts in infested areas
  - Fertilize properly (particularly nitrogen)
  - DO NOT overhead water
  - DO NOT handle plants when wet
  - Remove and dispose of contaminated plants (burn, bury, hot compost)

Vegetable Diseases

**Aster Yellows**

- **Causes:** Aster yellows phytoplasma
- **Hosts**
  - Carrot
  - Potato
  - Other vegetables
- **Favorable environment:** None
- **Transmission:** Aster leafhopper

Vegetable Diseases

**Aster Yellows**

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

**Common Smut**

- **Cause:** *Ustilago maydis*
- **Host:** Sweet corn
- **Favorable environment**
  - None (ear infections)
  - Hail (leaf and stalk infections)

**Control**

- Plant resistant varieties
- Reduce physical damage to corn plants
- DO NOT use chemical or biological controls
- Give up on your corn and eat the smut (huitlacoche)

**Corn Ruts**

- **Cause**
  - *Puccinia sorghi* (common rust)
  - *Puccinia polysora* (Southern rust)
- **Host:** Sweet corn
- **Favorable environment**
  - Moderate temperatures
  - Long periods of leaf wetness

**Control**

- Plant resistant varieties
- Use fungicides to prevent infections
  - Chlorothalonil, mancozeb, propiconazole, tebuconazole
  - Alternate active ingredients (FRAC codes)
  - Apply at 7-14 days intervals

Vegetable Diseases
Vegetable Diseases
Bean Leaf Diseases

- Causes
  - *Pseudomonas syringae pv. syringae* (bacterial brown spot)
  - *Xanthomonas campestris pv. phaseoli* (common blight)
  - *Pseudomonas syringae pv. phaseolicola* (halo blight)

- Hosts
  - Snap bean
  - Kidney bean
  - Lima bean

- Favorable environment: Driving rain (?)

Vegetable Diseases
Bean Leaf Diseases

- Control
  - Purchase high quality seed
  - Use resistant varieties where available
  - DO NOT overhead water
  - Use bactericides to prevent infections
    - Copper
      - Apply at 7-14 days intervals
      - Tolerant bacterial strains are a problem

Vegetable Diseases
Root Rots

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

- Hosts
  - Snap beans
  - Peas
  - Carrots
  - Other vegetables

- Favorable environment: Wet, cool soils
Vegetable Diseases

**Root Rots**

- **Control**
  - Routinely rotate crops
  - DO NOT grow host plants in an infested areas
  - Plant non-hosts in infested areas
  - Improve soil drainage
  - DO NOT over-water
  - DO NOT over-mulch

**Vegetable Diseases**

**Root Rots**

- **Control**
  - Use fungicides to prevent infections
  - *Streptomyces lydicus*
  - Apply at seeding
  - Apply at 7-14 day intervals after emergence (spray/drench)

**Vegetable Diseases**

**White Mold**

- **Cause:** *Sclerotinia sclerotiorum*
- **Hosts**
  - Snap beans
  - Carrots
  - Many other vegetables
- **Favorable environment**
  - Cool temperatures
  - High moisture (including high humidity)

**Vegetable Diseases**

**White Mold**

- **Control**
  - Buy high quality vegetable seed
  - Prevent introduction through other seed
  - Routinely rotate crops
  - Avoid planting susceptible vegetables in infested areas (5-7 yrs)
  - Plant non-hosts in infested areas
  - Plant beans (and other vegetables) with wider row spacings
**Vegetable Diseases**

**White Mold**

- Control
  - DO NOT over-water
  - DO NOT over-mulch
  - DO NOT over-fertilize
  - Control broad-leaf weeds
  - Use biological control products
    - *Coniothyrium minitans*
    - Parasitizes sclerotia

**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*
*Follow on Facebook and Twitter @UWPDDC*