Vegetable Diseases

Damping-Off/Seedling Blights

- **Pathogens**
  - *Pythium* spp.
  - *Rhizoctonia solani*
  - *Fusarium* spp.
- **Hosts:** Any vegetable
- **Favorable environment:** Cool, wet soils

**Control**
- Use a pasteurized soil mixture
- Decontaminate pots/working surfaces/tools (bleach, 70% alcohol, disinfectants)
- Moderate soil moisture
  - Use a soil with adequate drainage
  - DO NOT overwater
  - Germinate seeds at higher temperatures

Vegetable Diseases

Fungal Leaf Blights

- **Pathogens**
  - *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 contaminated debris
  - Burn (where allowed)
  - Deep bury
  - Hot compost
  - Move tomatoes to new location

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- **Control (early blight, Septoria leaf spot)**
  - Plant resistant varieties
  - Space plants far apart
  - Mulch around the base of plants
  - DO NOT overmulch

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- **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

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- **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)
Vegetable Diseases
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

Vegetable Diseases
Bacterial Tomato Diseases

- Pathogens
  - *Pseudomonas syringae* pv. *tomato* (bacterial speck)
  - *Xanthomonas* spp. (bacterial spot)
- Host: Tomato
- Favorable environment
  - Cool, wet weather (bacterial speck)
  - Warm, wet weather (bacterial spot)

Vegetable Diseases
Bacterial Tomato Diseases

- Control
  - Remove and destroy contaminated debris
    - Burn (where allowed)
    - Deep bury
    - Hot compost
  - Remove and destroy volunteer tomatoes

Vegetable Diseases
Bacterial Tomato Diseases

- Control
  - Start with pathogen-free seeds and plants
  - Hot water treat seeds (122°F, 25 minutes)
  - Move tomatoes to new location
  - Space plants far apart
  - Mulch around the base of plants
  - DO NOT overmulch

Vegetable Diseases
Bacterial Tomato Diseases

- Control
  - 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, watermelon)
- **Favorable Environment:** Drought

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**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

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**Vegetable Diseases**

**Vascular Wilts**

- **Pathogens**
  - *Verticillium* spp. (*Verticillium* wilt)
  - *Fusarium oxysporum* (*Fusarium* wilt)
- **Hosts**
  - Solanaceous vegetables  
    (tomato, potato, pepper, eggplant)
  - Cucurbits  
    (pumpkin, squash, cucumber, watermelon)

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**Vegetable Diseases**

**Vascular Wilts**

- **Favorable environment**
  - Wet weather (for infection)
  - Dry weather (for symptom development)
**Vegetable Diseases**

**Vascular Wilt**

- **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 overwater
  - DO NOT overmulch
  - DO NOT use fungicides or biological controls

**Walnut Toxicity**

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

**Management**

- DO NOT plant sensitive vegetables near walnut trees
- Plant tolerant vegetables
  - Beans
  - Corn
  - Parsnip
  - Squash
- Plant sensitive vegetables
  - in raised beds
  - in pots

**Causes**

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

**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

**Vegetable Diseases**

**Powdery Mildew**

- **Pathogens**
  - Miscellaneous powdery mildew fungi
  - *Oidium* spp.

- **Hosts**
  - Cucurbits (cucumber, squash, pumpkin)
  - Other vegetables (pea, tomato)

- **Favorable environment:** High humidity

**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

- 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
**Vegetable Diseases**

**Downy Mildew**

- **Pathogens**
  - *Pseudoperonospora cubensis*
  - *Peronospora belbahrii*
- **Hosts**
  - Cucurbits (cucumber, squash, pumpkin)
  - Basil

**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
- Destroy diseased and asymptomatic plants
  - Burn (where allowed)
  - Double bag and landfill

- Use fungicides to prevent infections (cucurbits)
  - Chlorothalonil, mancozeb, phosphorus acids
  - Copper
  - Start applications based predictive models ([https://cdm.ipmpipe.org/](https://cdm.ipmpipe.org/))
  - Apply at 7-14 day application interval
### Vegetable Diseases
#### Bacterial Wilt

- **Pathogen:** *Erwinia tracheiphila*
- **Hosts:** Cucurbits (cucumber, squash, pumpkin)
- **Favorable environment:** None
- **Transmission:** Cucumber beetles

#### 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

### Vegetable Diseases
#### Cucumber Mosaic

- **Pathogen:** *Cucumber mosaic virus* (CMV)
- **Hosts:**
  - Cucurbits
  - Pepper
  - Tomato
  - Other vegetables
- **Favorable environment:** None
- **Transmission:** Aphids

#### Control
- Plant resistant/tolerant varieties
  - Plant based resistance
  - Plant based tolerance
  - Genetically modified plants
- Eliminate weed hosts
- Apply insecticides to control aphids
- DO NOT use chemical or biological controls
Vegetable Diseases
Common Scab

• Pathogen: *Streptomyces scabies*
• Hosts
  – Potato
  – Carrot
  – Other root crops
• Favorable environment: High soil pH

Vegetable Diseases
Bacterial Soft Rot

• Pathogen: *Pectobacterium carotovorum*
• Hosts
  – Potato
  – Carrot
  – Other vegetables
• Favorable environment
  – Wet soils
  – Wet storage conditions

Vegetable Diseases
Common Scab

• Control
  – Plant scab-free potato stock
  – Routinely rotate crops
    • DO NOT grow host plants in an 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

• Control
  – Moderate soil moisture
  – DO NOT overhead water
  – 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**

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

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**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)

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**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

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**Vegetable Diseases**  
**Black Rot**

- **Control**  
  - Remove and dispose of contaminated plants  
    - Burn (where allowed)  
    - Deep bury  
    - Hot compost  
  - Decontaminate infested items  
    (70% alcohol, disinfectants, bleach)

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**Vegetable Diseases**  
**Black Rot**

- **Control**  
  - Use bactericides to prevent infections  
    - Copper  
    - Apply at 7-14 days intervals  
    - Tolerant bacterial strains are a problem
Vegetable Diseases
Aster Yellows

• Pathogen: Aster yellows phytoplasma
• Hosts
  – Carrot
  – Potato
  – Other vegetables
• Favorable environment: None
• Transmission: Aster leafhopper

Vegetable Diseases
Common Smut

• Pathogen: 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)

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

**Corn Rusts**

- **Pathogens**
  - *Puccinia sorghi* (common rust)
  - *Puccinia polysora* (Southern rust)
- **Host:** Sweet corn
- **Favorable environment**
  - Moderate temperatures
  - Wet weather

**Control**

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

**Bean Leaf Diseases**

- **Pathogens**
  - *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

• Copper
  • Apply at 7-14 days intervals
  • Tolerant bacterial strains are a problem

Vegetable Diseases
Root Rots

• Pathogens
  – *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)

Vegetable Diseases
Root Rots

• 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 overwater
  – DO NOT overmulch

• Control
  – Use biological control products
    • *Streptomyces lydicus*
    • Apply at seeding
    • Apply at 7-14 day intervals after emergence (spray/drench)
**Vegetable Diseases**

**White Mold**

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

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**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
  - DO NOT overwater
  - DO NOT overmulch
  - DO NOT overfertilize
  - Control broad-leaf weeds
  - Use biological control products
    - *Coniothyrium mimitans*
    - Parasitizes sclerotia

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**Vegetable 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  
https://pddc.wisc.edu  
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