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

**Control**

- Remove and destroy contaminated debris
  - Burn (where allowed)
  - Deep bury
  - Hot compost
- Move tomatoes to new location

**Control**

- Plant resistant varieties
- Space plants far apart
- Mulch around the base of plants
- DO NOT overmulch
Vegetable Diseases
Fungal Leaf Blights

• Control (early blight, Septoria leaf spot)
  – DO NOT overhead water
  – Thin plants as they grow
  – Use fungicides to prevent infections
    • Chlorothalonil, mancozeb
    • Copper
    • Alternate active ingredients (FRAC codes)
    • Apply at 7-14 days intervals

• 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

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

**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

**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

**Bacterial Tomato Diseases**

- Cause: Calcium deficiency
- Affected plants
  - Tomato
  - Pepper
  - Eggplant
  - Cucurbits
    (cucumber, squash, pumpkin, watermelon)
- Favorable Environment: Drought

**Bacterial Tomato Diseases**

- 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

• Pathogens
  – *Verticillium* spp. (*Verticillium* wilt)
  – *Fusarium oxysporum* (*Fusarium* wilt)

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

Vegetable Diseases
Vascular Wilts

• Favorable environment
  – Wet weather (for infection)
  – Dry weather (for symptom development)

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 overwater
  – DO NOT overmulch
  – DO NOT use fungicides or biological controls

Vegetable Diseases
Walnut Toxicity

• Cause: Juglones
  – Black walnut
  – Butternut
  – Hickory

• Affected plants
  – Many vegetables
  – Tomato, potato, pepper, eggplant
  – Asparagus, cabbage
Vegetable Diseases
Walnut Toxicity

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

Vegetable Diseases
Herbicide Injury

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

Vegetable Diseases
Powdery Mildew

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

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudoperonospora cubensis</em></td>
<td>Cucurbits (cucumber, squash, pumpkin)</td>
</tr>
<tr>
<td><em>Peronospora belbahrii</em></td>
<td>Basil</td>
</tr>
</tbody>
</table>

- **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

- **Favorable environment**
  - High moisture
  - High humidity
  - Moderate/warm temperatures
**Vegetable Diseases**

**Downy Mildew**

- 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

- Control
  - DO NOT overcrowd plants
  - DO NOT overhead water
  - Destroy diseased and asymptomatic plants
    - Burn (where allowed)
    - Double bag and landfill

**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

**Common Scab**

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

**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**
**Black Rot**

- **Pathogen:** *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)

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

- **Control**
  - Routinely rotate crops
  - DO NOT grow host plants in infested areas
  - Plant non-hosts in infested areas
  - Fertilize properly (particularly nitrogen)
  - DO NOT overhead water
  - DO NOT handle plants when wet

---

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

- **Control**
  - Remove and dispose of contaminated plants
    - Burn (where allowed)
    - Deep bury
    - Hot compost
  - Decontaminate infested items (70% alcohol, disinfectants, 10% bleach)

---

**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

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**Vegetable Diseases**

**Aster Yellows**

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

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**Vegetable Diseases**

**Common Smut**

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

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**Vegetable Diseases**

**Common Smut**

- **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)
Vegetable Diseases
White Mold

• Pathogen: \textit{Sclerotinia sclerotiorum}
• Hosts
  – Snap beans
  – Carrots
  – Many other vegetables
• Favorable environment
  – Cool temperatures
  – High moisture (including high humidity)

**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

• Control

– DO NOT overwater
– DO NOT overmulch
– DO NOT overfertilize
– Control broad-leaf weeds
– Use biological control products
  • \textit{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
https://pddc.wisc.edu
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