What is a vegetable?
Any plant part grown as food other than a sweet fruit or seed.

What are vegetable families?
- Cole Crops: cabbage, broccoli, cauliflower and Brussels sprouts
- Root Crops: carrots, beets and onions
- Leafy Greens: lettuce, spinach and Swiss chard
- Cucurbits: cucumber, summer squash, winter squash and melons
- Solanaceous: tomatoes, peppers, eggplant and potatoes
- Legumes: peas and beans

What is a plant disease?
A plant disease is any harmful alteration in the structure or function of a plant.

Common types of plant diseases:
- Fungi
- Bacteria
- Viruses
- Viroids
- Nematodes

Fungi
- More than 10,000 species cause plant disease
- Lack chlorophyll
- Decay plants or live off of living plants
- Reproduce by spores
- Disseminate by wind, water, soil, equipment, insects and root graphs
Common garden Fungi include:

- Powdery Mildew
- Early Blight (Alternaria)
- Gray Mold (Botrytis)
- Angular Leaf Spot
- Anthracnose
- Verticillium Wilt
- Pythium

Powdery mildew on squash

Early blight

Gray Mold on Peas

Anthracnose on pepper

Angular Leaf Spot on Cucumber
Bacteria

- 300 species cause plant disease
- Help decompose enormous quantities of organic matter
- Single-celled microorganisms
- Reproduce by splitting
- Cannot make their own food
- Spread by splashing water and insects

Pythium on Cucumber

Viruses

- 500 species cause plant disease
- Extremely tiny
- Cannot survive without host
- Transmitted by insects

Bacterial Speck on Tomato

Bacterial Blight on Beans

Cucumber Mosaic Virus on Squash

Bacterial Speck on Tomato

Bacterial Blight on Beans

Cucumber Mosaic Virus on Squash
**Tomato Spotted Wilt Virus**

**Viroids**
- Less complex than viruses
- Transmitted by vegetative propagation

**Aster Yellows on Carrot**

**Stem, Crown and Root Rot**
- Pythium
- Phytophthora
- Fusarium
- Rhizoctonia
- Verticillium

**Pythium**
- Infects young tissue
- Commonly attacks below the soil surface
- Favored by wet, poorly drained conditions

**Vegetables affected by Pythium**
- Vegetable seedlings
- Beans
- Beets
- Carrots
- Cucumbers
- Eggplant
- Leafy greens
- Melons
- Peas
- Peppers
- Potatoes
- Pumpkin and Squash
- Tomato
Phytophthora

- Stem discoloration
- Wilting
- Premature leaf drop
- Stunting
- Stem dieback
- Plant death

Vegetables affected by Phytophthora
- Eggplant
- Pumpkin
- Squash
- Tomato
- Potato
- Pepper

Fusarium

- Necrotic lesions at soil line
- Plants wilt and die
- Decay is soft and mushy

Vegetables affected by Fusarium
- Beans
- Beets
- Carrots
- Cole Crops
- Peas
- Asparagus
- Beans
- Cucumber
- Cole Crops
- Melons
- Onion
- Peas
- Potatoes
- Tomato

Rhizoctonia

- Moist brown lesions
- Decay of crown areas and sometime roots
- White cottony fungal growth

Vegetables affected by Rhizoctonia
- Beans
- Beets
- Carrots
- Cole Crops
- Peas
Verticillium
- infected leaves turn yellow
- browning of older leaves
- darkening of tissues in the stems
- fungal resting spores persist in the soil more than 4 years

Vegetables affected by Verticillium
- Eggplant
- Peppers
- Potatoes
- Tomatoes

Vegetable Leaf Diseases
- Most fungal or bacterial
- Identification important
- Treatment depends on time of infection
- May spread to stems and fruit

Angular Leaf Spot
- Small irregularly shaped spots
- Water soaked to gray spots
- Some hosts have a yellow halo
- Spots turn gray to tan and fall out
- Lesions limited by leaf veins
- Spreads to fruit

Angular Leaf Spot Hosts:
- Beans
- Cucumber
- Pumpkin
- Squash

Stem, Crown and Root Rot: Prevention
- Use pasteurized rowing media
- Crop rotation
- Good sanitation
- Good drainage
- Don’t overwater
Anthracnose
- Small circular water soaked spots on leaves on lettuce and spinach
- Melons leaves, stems and fruit affected
- Fruit primarily affected in tomatoes and peppers

Hosts:
- Beans
- Cucumber
- Eggplant
- Melons
- Pumpkin
- Squash
- Tomato

Alternaria leaf blight
- Many different kinds of alternaria cause leaf blight and black mold in the crops
- Begin as specks and enlarge
- Causes early blight, black mold and stem canker on tomatoes

Hosts:
- Carrots
- Beans
- Broccoli
- Brussels Sprouts
- Cabbage
- Eggplant
- Melons
- Onion (purple blotch)

Alternaria Hosts:
- Beans
- Cucumber
- Eggplant
- Melons
- Onion

Cercospora leaf spot
- Small flecks with gray to tan centers
- Yellow halo
- Petiole lesions elliptical and brown with a pale center
- Does not affect roots

Hosts:
- Beets
- Carrots
- Cauliflower
- Cucumber
- Eggplant
- Melons
- Onion (purple blotch)
**Downey Mildew**
- Doesn't overwinter in Wisconsin
- Starts as small pale green to angular to rectangular spots limited by leaf veins
- Early symptoms mosaic or mottled
- Light gray to purple sporulation on underside of leaf when conditions are favorable.

**Downey Mildew Hosts:**
- Broccoli
- Brussels sprouts
- Cabbage
- Cauliflower
- Leafy greens
- Melons
- Pumpkin
- Squash

**Powdery Mildew**
- White powdery growth on leaf surfaces
- Underlying tissue turns chlorotic or necrotic
- Rarely affects fruit
- Can reduce yield
- Can sunburn fruit

**Powdery Mildew Hosts:**
- Cucumber
- Melons
- Peas
- Pumpkin
- Squash

**Bacterial Wilt**
- Rapid wilt and collapse of vines
- Transmitted by cucumber beetle
- Wilting leaves take on a dark green color
- Late leaves chlorotic and then necrotic
- Use the ooze test

**Bacterial Wilt Hosts:**
- Cucumber
- Melons
- Pumpkin
- Squash
Mosaic Virus
- Many viruses
- Contorted/spindle leaves
- Leaf discoloration
- Misshapen fruit
- Changes in leaf texture

Mosaic Virus Hosts:
- Beans
- Cucumber
- Lettuce
- Melon
- Peas
- Pumpkin
- Squash

Avoiding leaf and fruit diseases
- Appropriate spacing
- Good plant nutrition
- Plant rotation
- Resistant varieties
- Rouging
- Sanitation
- Appropriate light
- Water early or at the base of plants

Other disorders
- Nutrient deficiency
- Cold injury
- Drought stress
- Hail damage
- Herbicide injury
- Flooding
- Pollination

Questions?