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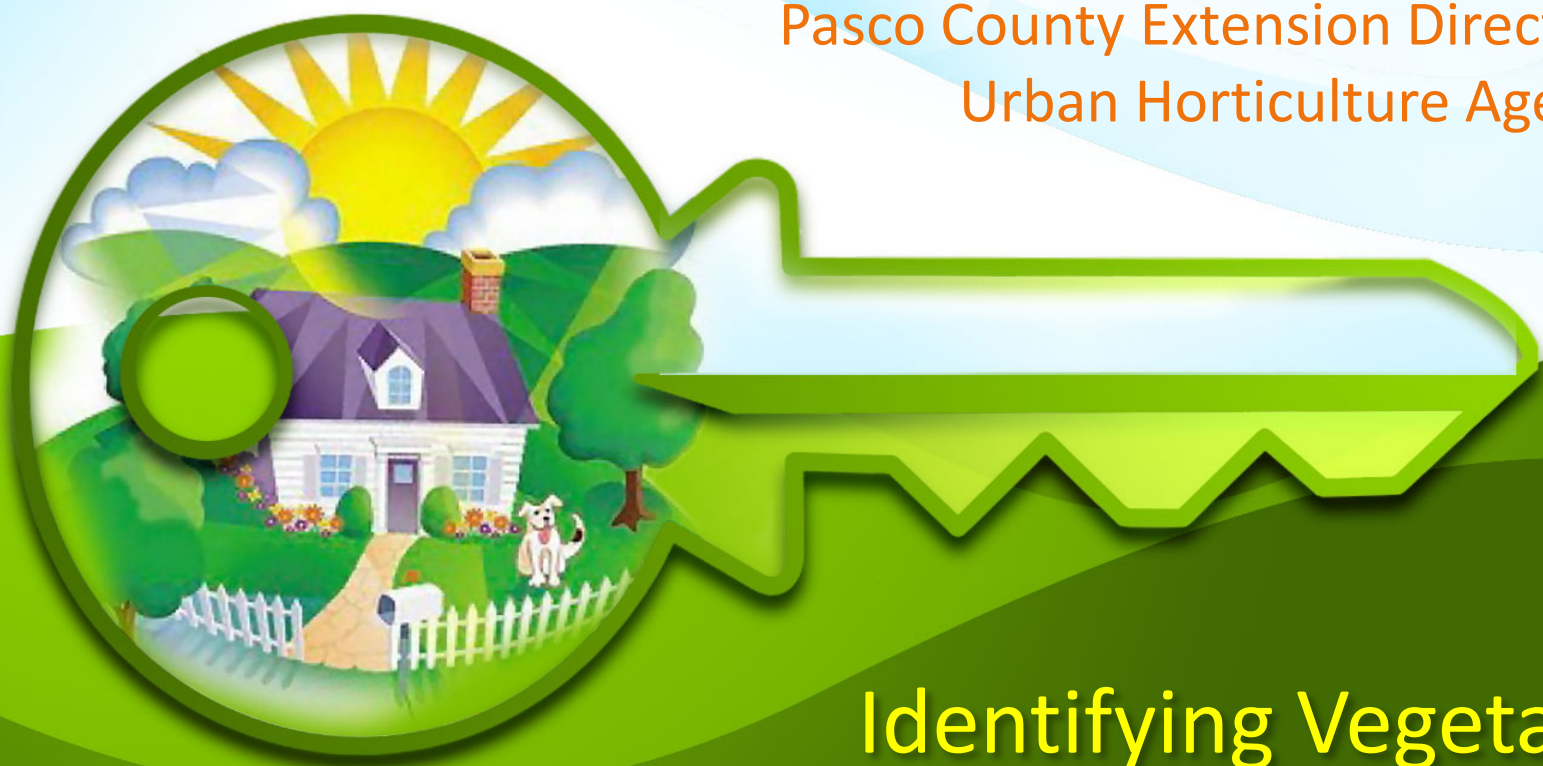


Identifying Vegetable Diseases in the Home Garden

UF | IFAS Extension
UNIVERSITY of FLORIDA

Objectives

- Define terms disease, pathogen, abiotic and biotic

- Types of pathogens
  - Fungi
  - Bacteria
  - Viruses
  - Nematodes

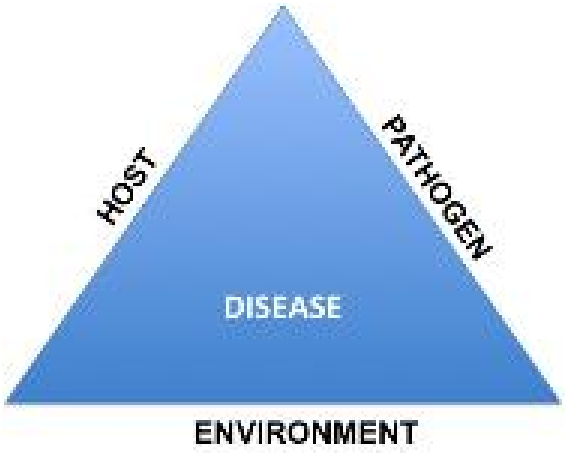
- Diagnosing veggie diseases

What is disease?

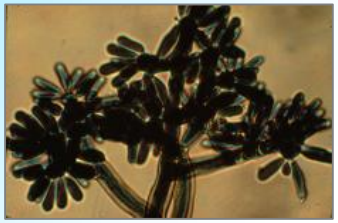
- Any malfunction in a plant caused by a pathogen

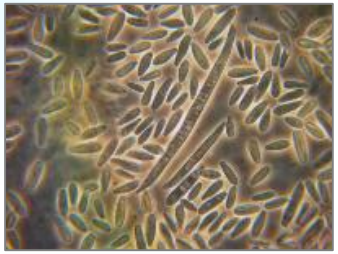
- Abiotic factors
  - Environmental (non-living)
  - Sunlight, drought, irrigation, heat, cold, soil texture, pH, fertility, etc.

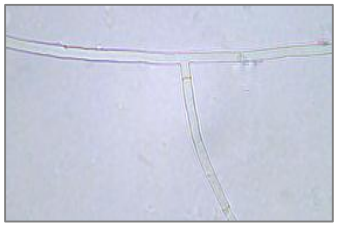
- Biotic factors
  - Living (pathogens)



Fungi as Pathogens





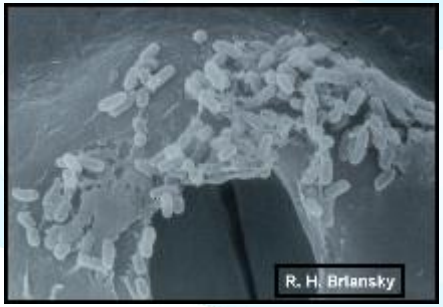


- About 85% of plant diseases are caused by fungi
- multi-celled microorganisms that may be seen without a microscope during certain stages of their life cycles
- Fungi have no chlorophyll, and their cell walls are composed of chitin
- Many species of fungi can be identified by the microscopic spores they produce

Getting around…

- Wind, splashing water (rain or irrigation), insects, birds
- Fungi that live in the soil can move from plant to plant by growing out from infested plant debris in the soil
- Some fungi can survive on their own for long periods of time without a host
  - Soil, plant debris, “resting” structures
- Fungi can also be spread by human activity
  - Tissue, tools, hands, pants, etc.
- Enter through natural openings or through wounds; penetrate directly through the plant's cuticle

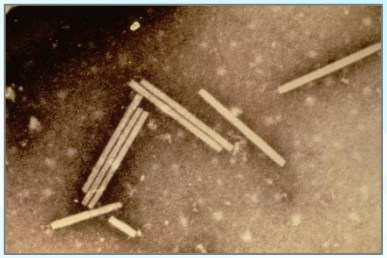
Bacteria as pathogens



- Bacteria are one-celled microorganisms; microscopic
- Most plant pathogenic bacteria do not produce spores; host to survive
- Splashing water (irrigation, wind-driven rain)
- Human activities
  - Hands, tools, etc.

- Bacteria cannot penetrate the cuticle of plants
  - Wounds or natural openings
- Special sub-groups of bacteria require an insect host for dispersal and entry into the plant
  - Huanglongbing (aka: citrus greening) – Asian Citrus Psyllid

Viruses as plant pathogens



- Viruses are the smallest of the three pathogens; electron microscopy
- Genetic material (RNA or DNA), which is usually wrapped in a protein coat
- They must have a living host in order to replicate
- Viruses are usually spread from diseased to healthy plants by insects
  - Mites, nematodes, fungi
  - Humans – hands, clothes, tools, cigarettes

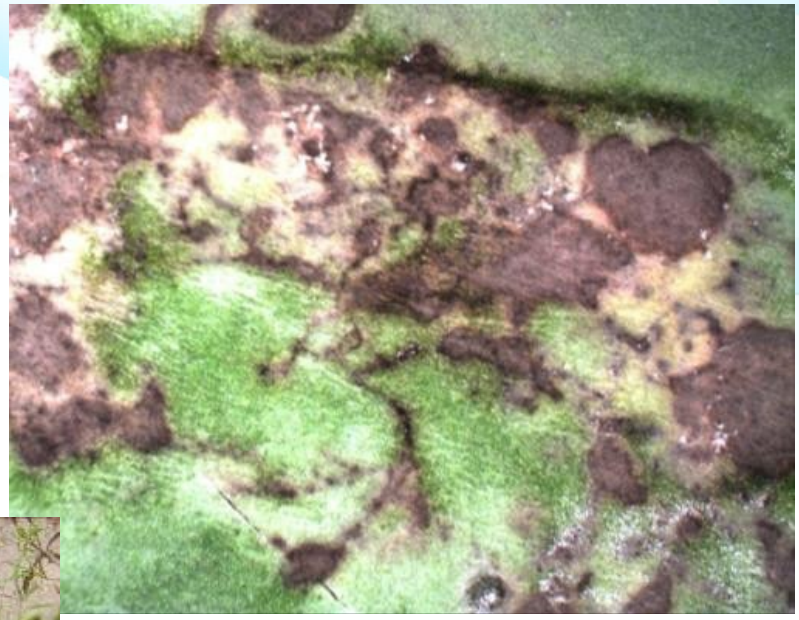
- The organism spreading the virus is referred to as a vector
- Most viruses are vectored by aphids or whiteflies

Symptoms of plant disease

- Abnormal features of the plant that indicate something is wrong
  - A *spot* is just that, a spot; note the part of the plant exhibiting the symptom
  - If there are spots on the leaves, they will be called “leaf spots”
  - Spots on the fruit are “fruit spots”
  - The technical term for a spot is "*lesion*"
  - As spots grow together (coalesce), the symptom is called a *blight*



Environmental Aspects



Downy mildew in wet weather

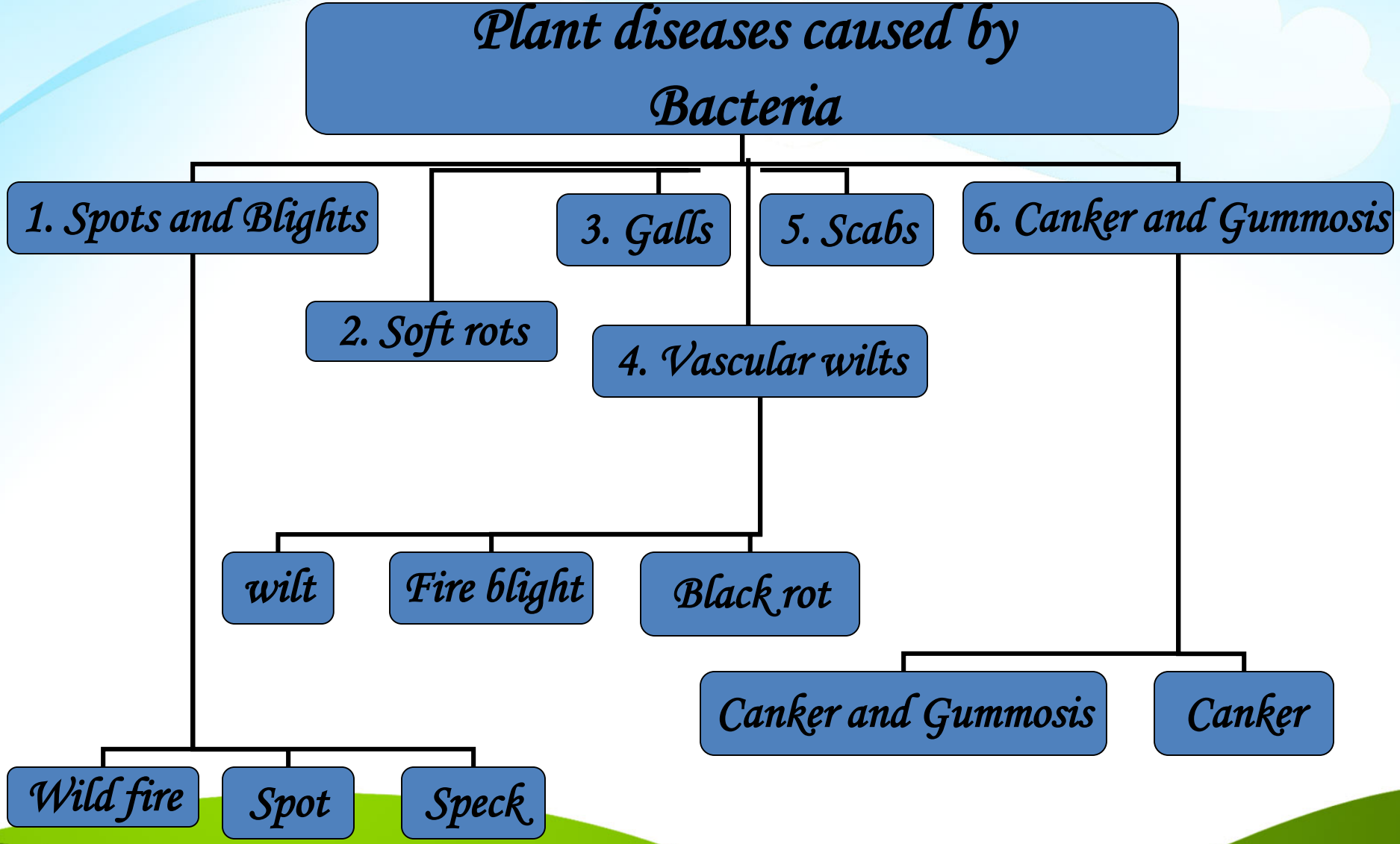
Powdery mildew in dry weather

Symptoms

- *Galls* (tumors)
  - on stems, roots, or sometimes on leaves
  - masses of undifferentiated tissue growth, similar to cancerous tumors
  - easily confused with those caused by insects
  - *Cankers* are sunken lesions, found mostly on stems but can also occur on tree trunks

Symptoms

- *Wilts* and *rots* are just what the names imply
- Rot does not have to be wet and "yucky"; there are dry rots
- The plant tissue is being degraded by the
  - pathogen vs. drought responsible for a wilt?
  - make a vertical cut (cross-section) near the base of the plant or individual wilted stem
  - If a pathogen is present, the vascular (water-conducting) tissue will appear dark
  - a plant wilting from water stress will have normal white, off-white or light-green vascular tissue


Plant diseases caused by Bacteria
1. Spots and Blights
2. Soft rots
3. Galls
4. Vascular wilts
5. Scabs
6. Canker and Gummosis
wilt
Fire blight
Black rot
Canker and Gummosis
Canker
Wild fire
Spot
Speck

Symptoms

- *Damping-off*
  - the rotting of seedlings as they emerge from the soil or potting mix
  - there are two types of damping-off diseases:
    - pre-emergence damping-off occurs when a germinating seed is infected and dies before it emerges from the ground
    - post-emergence damping-off occurs when a fully emerged seedling is infected at the soil line and dies

Viral symptoms

- mottling in the color of leaves and fruit (mosaics)
- yellowing and/or crinkling of leaves, misshapen leaves
- yellow or necrotic rings on leaves or fruits
- plants that appear stuntded because they have shortened internodes



Signs

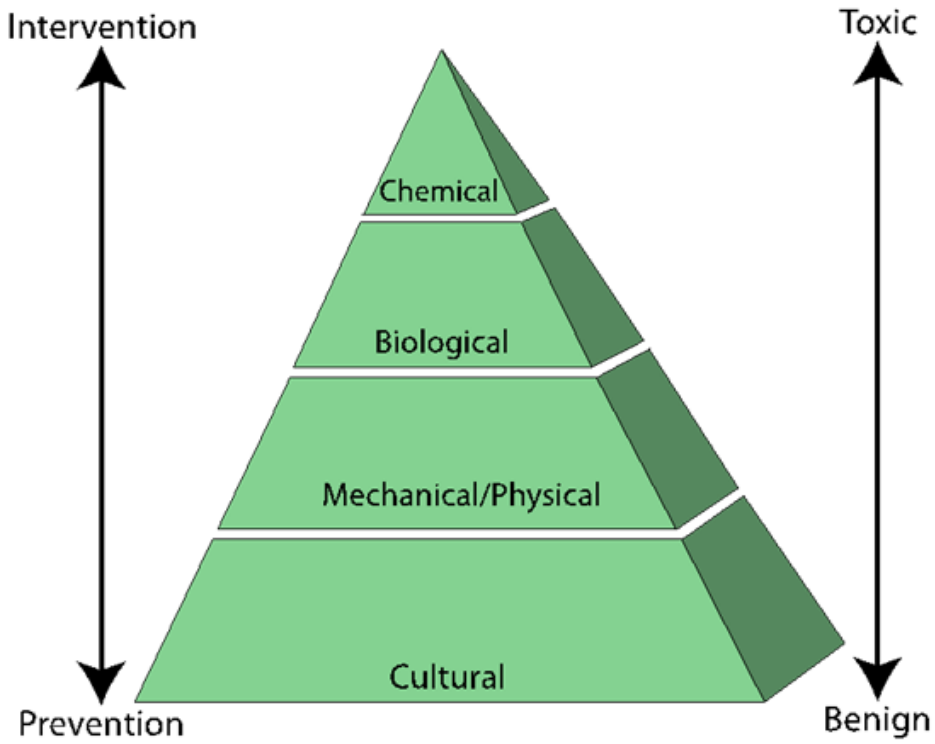
- Plant disease diagnosis is often difficult or nearly impossible to make on the basis of symptoms alone
- Symptoms of specific diseases and some abiotic disorders overlap
- To properly diagnosis disease, look for the “signs” of the pathogen
- Presence of the pathogen itself viewed with the unaided eye, a hand lens, or a microscope
- With fungal diseases, one can often see the actual fungal growth
  - Examples of signs are mycelium, spore masses such as molds or rusts, sclerotia, conks, and mushrooms.
  - Mycelium can be seen on or around a lesion (spot, canker, blighted area)



Bacterial “signs”

- Bacterial infections often produce water-soaking around the area where the pathogen entered
- Lower surface of the leaf will take on a dark, greasy appearance
- Bacterial ooze can be seen coming from a lesion, especially in the morning hours
- Some bacterial diseases also have distinctive odors.

Integrated Pest Management (IPM)



Chemical Control

- Viral disease – no chemicals; cultural controls
- Bacterial disease – cultural controls
  - Bactericides not for veggies
- Fungal diseases – fungicides
  - Active ingredients
    - Copper sulfate, copper hydroxide, copper octanoate, Bordeaux mixture
    - Sulfur formulated and labeled for veggies
    - Chlorothalonil
    - Mancozeb
    - Triadimefon
- Horticultural Oils
- Biologics

Summary

- Diseases can be abiotic or biotic (or both)
- Pathogens that cause disease
  - Fungi, bacteria, viruses, nematodes
- Symptoms vs. signs
- Dead plants don’t tell tales…
- Integrated Pest Management (IPM) key to prevention

Questions?

- Thank you!

- wcelmore@ufl.edu

- UF/IFAS Plant Disease Diagnostic Clinic
  - Fee-based
  - Submission instructions
  - Submission form
  - https://plantpath.ifas.ufl.edu/extension/plant-diagnostic-center/