

Pest, Disease, and Weed Management in Vegetable Gardens



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Part IV

Diseases

Types of Diseases

Abiotic Disorder (Disease)

- Caused by environmental or cultural conditions

Biotic Disease

- Caused by a pathogenic organism



Drought



User-Error



Bacteria



Fungi



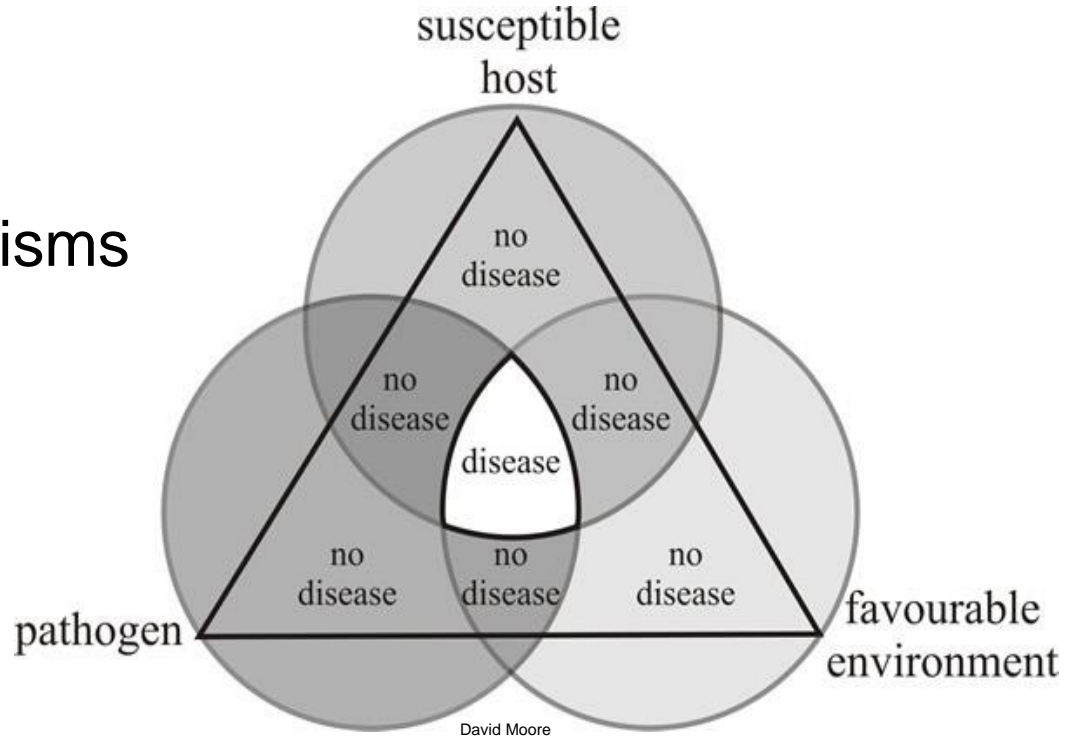
Nematodes

Biotic Diseases

Caused by pathogens

Causal Organisms

- Fungi & fungal-like organisms
- Bacteria
- Viruses
- Nematodes



Disease Triangle

all factors must be present for a pathogen to cause disease.

Signs of Pathogens



Mycelia



Ooze and Slime



Spores



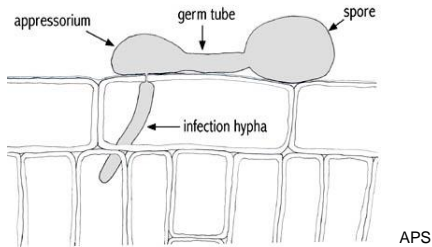
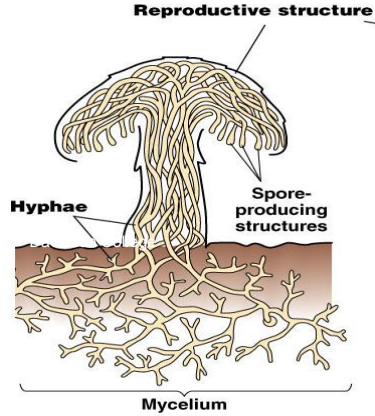
Fruiting Bodies



Symptoms of Pathogens



Types of Pathogens

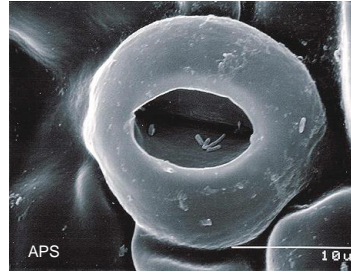


Penetrate healthy tissue

Fungi

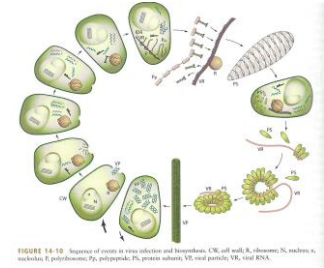


Much smaller than fungi

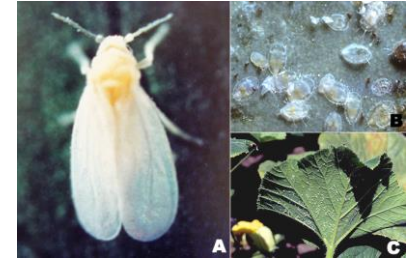


Enter wounds & stomata

Bacteria



Infectious DNA/RNA



Spread by vectors

Viruses

Natural Disease Control Products

- **Protect plants** from disease as part of integrated system
- **New growth protected**



Cornell University

Mineral-Based Fungicides

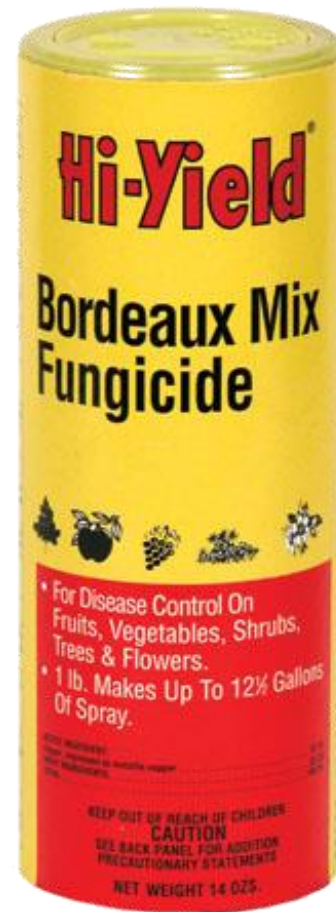
Sulfur

- Fungal disease control
- Avoid inhalation

Copper

Fungal and bacterial diseases

- Contact protectant
- Apply carefully - Leaf damage can occur



Natural Fungicides

Bacillus subtilis (Serenade®)

- Multiple modes of action
- For leaf diseases

Potassium bicarbonate

- Especially effective for powdery mildew
- Remedy® and other brands
- **Must apply at first symptoms!**



Cucurbit Downy Mildew

(Oomycota: *Pseudoperonospora cubensis*)

Hosts

- Cucumber, melons, squashes

Signs & Symptoms

- Angular yellow lesions on top and bottom of leaves
- May appear fuzzy on bottom

Management

- Plant early
- Scout and destroy
- Copper fungicides provide *some* protection



Dr. Lina Quesada
NCSU Vegetable Pathology Lab

Cucurbit Powdery Mildew

(Ascomycota: *Podosphaera xanthii* or *Erysiphe cichoracearum*)

Hosts

- Most cucurbit crops

Signs & Symptoms

- White powdery fungal growth on leaves, petioles, stems
- Reduced growth and yield

Management

- Use resistant cultivars
- Copper fungicides



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Basil Downy Mildew

(Oomycota: *Pernonspora belbahrii*)

Hosts

- Basil, *Ocimum basilicum*

Signs & Symptoms

- Yellowing & browning of leaves
- Black spores on underside of leaves

Management

- Scout and destroy; keep leaves dry
- Try resistant cultivars
 - ‘Red Leaf,’ ‘Red Rubin’
 - Thai: ‘Queenette’
 - ‘Lemon,’ ‘Lemon Mrs. Burns,’ ‘Sweet Dany...’
 - ‘Spice,’ ‘Blue Spice,’ ‘Cinnamon’



Early Blight of Tomato

(Ascomycota: *Alternaria linariae*)

Hosts

- Tomato, eggplant

Signs & Symptoms

- Brown bull's eye lesion, yellow halo
- Usually starts on older leaves

Management

- Use resistant varieties
- Prune off lowest & infected leaves
- Copper fungicides
- IPM to reduce fungal infections



Late Blight of Tomato

(Oomycota: *Phytophthora infestans*)

Hosts

- Tomato, potato

Signs & Symptoms

- Brown, water soaked spots
- Entire leaf turns brown, remains attached
- Favors younger leaves, cool, humid weather
- Greasy spots on fruit
- Plant decline

Management

- Use resistant varieties
- Copper fungicides
- Remove, bag plants



Inga Meadows
NCSU Extension

Fusarium Wilt of Tomato

(Ascomycota: *Fusarium oxysporum*)

Hosts

- Tomato; eggplant & pepper

Signs & Symptoms

- Wilting despite adequate water
- Yellowing, browning leaves
- Death
- Brown pith

Management

- Use resistant varieties
- Look for 'F' on hybrid tomatoes



University of Minnesota Extension

Bacterial Wilt of Tomato

(Betaproteobacteria: *Ralstonia solanacearum*)

Hosts

- Tomato; eggplant, pepper, potato

Signs & Symptoms

- Wilting despite adequate water
- Brown pith
- Stem oozes in water
- Death

Management

- Use grafted tomatoes with resistant rootstocks
- (EMGVs will sell them in 2021!)



NC State

NC State Plant Pathology

Phytophthora Root Rot

(Oomycota: *Phytophthora* spp.)

Hosts

- Cucurbits, eggplant, pepper, potato

Signs & Symptoms

- Sudden wilt and collapse
- White moldy growth
- Death

Management

- Avoid planting in wet or poorly draining areas



Need Help with Vegetable Problems?

NC STATE EXTENSION

Master Gardener | Chatham County

Plant Clinic: MW 1:00-4:00, F 9:00-12:00

chathamemgv@gmail.com

919-545-2715 (Except during COVID-19, email is preferred)

Send us your problems!

Questions we may ask:

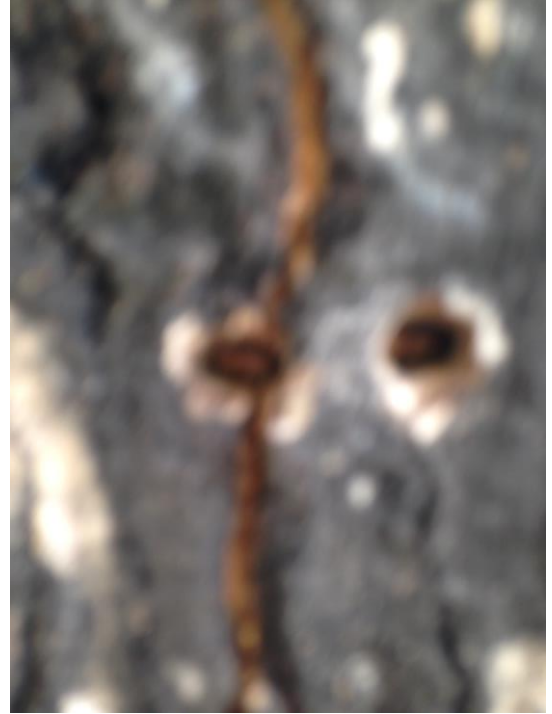
- Crop and cultivar
- Describe signs and symptoms
 - Include photos!
- When you started noticing problems
- Cultural conditions
 - Light, soil, water, planting time etc.



Send Us *Good* Photos!

Photos should:

- Include healthy and unhealthy parts
- Have a scale object
- Be in focus
- Show an up-close image
- Show the whole plant
- The more, the better



Diagnosis: cataracts?

Additional Resources

Including a copy of the presentation

<https://go.ncsu.edu/chathamveggies>

Questions from this class?

Matt Jones

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919-542-8243

Please Complete the Evaluation!

<https://go.ncsu.edu/veggie-evaluation3>