

Plant Diagnostics Review

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Many of the following slides are from Dr. Wes Chun

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Overview

- Abiotic or Biotic
- Disease Triangle
- Sources of Diseases
- Plant Diagnostics
- Useful Websites for MGs



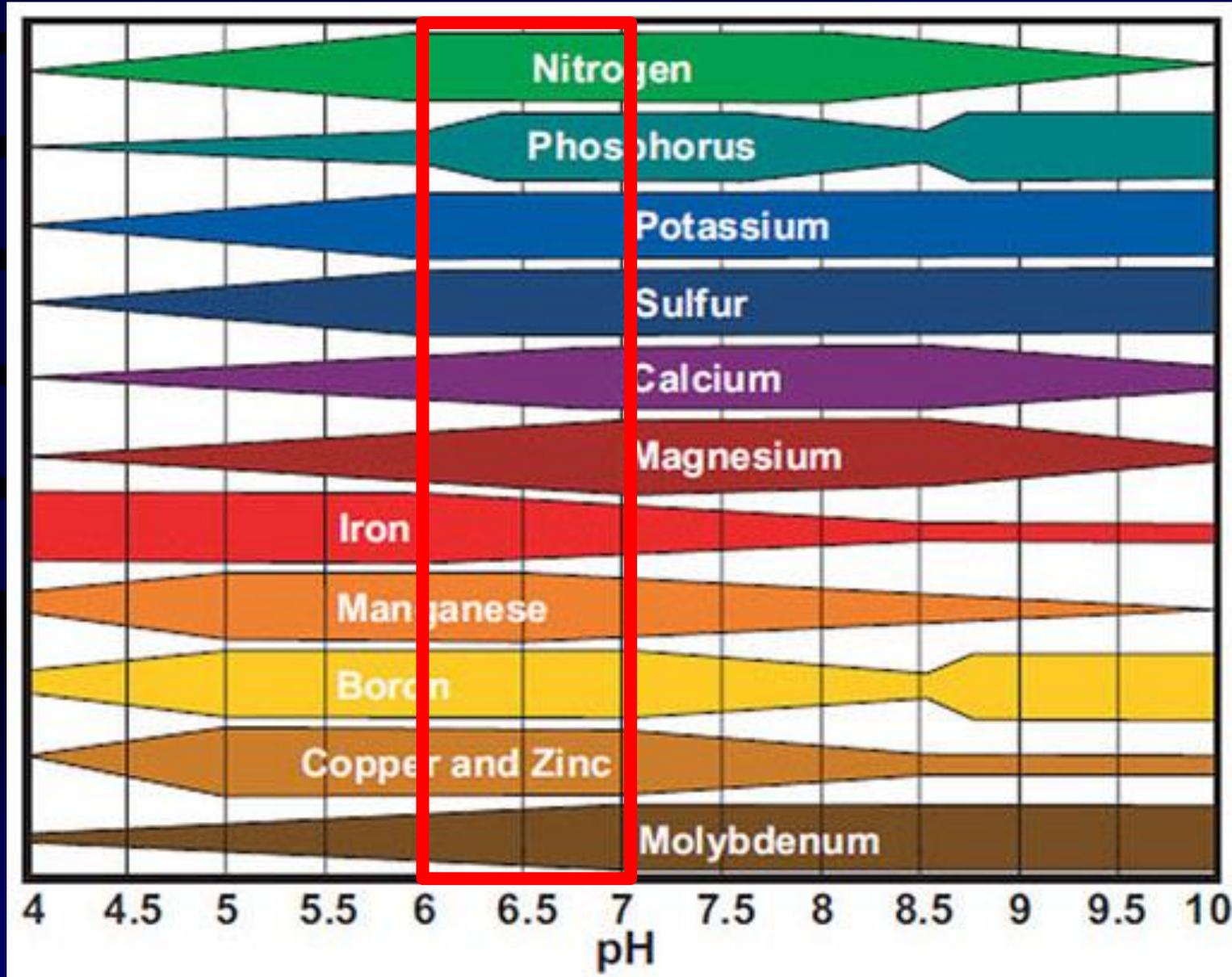
Source: NASA

Problem Problems- Abiotic or Biotic?

Abiotic- non living causes

- Nutrient Imbalances & pH Issues
- Environmental Stress
 - Cold, heat, wind, drought
 - Poor soil/poor drainage
- Improper Management
 - Weed eaters, lawnmowers
 - Planted too deep or too shallow
 - Watering issues, fertilizer & pesticide issues

Abiotic- non living causes



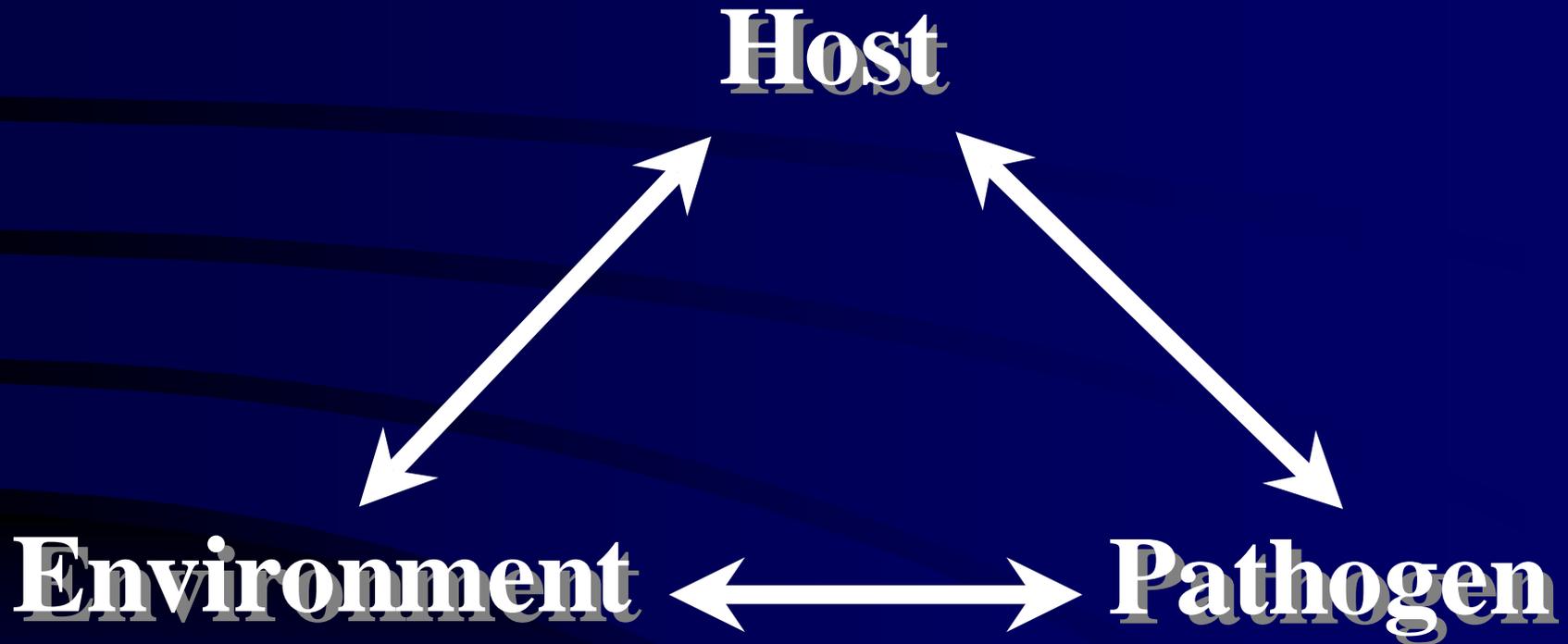
Problem Problems- Abiotic or Biotic?

Biotic- caused by living organisms

- Insects
- Fungi
- Bacteria
- Nematodes
- Viruses

The Disease Triangle

It takes three to tangle

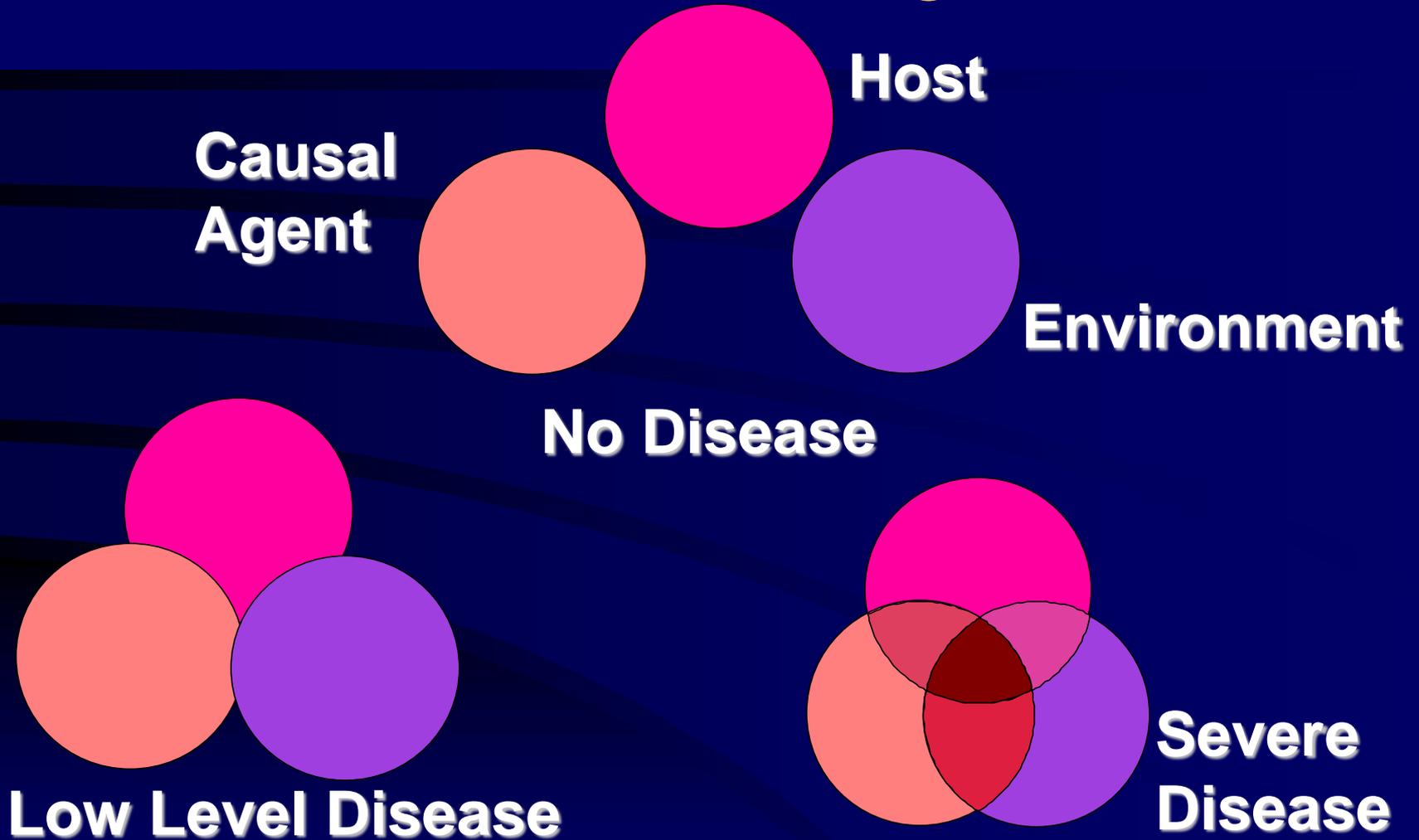


Disease: abnormal physiological response of the plant due to a chronic association with a primary causal agent.

Disease Triangle



Disease Triangle



Problem Sources: Insects

- Insects
 - Over 600 major species that cause problems on crops, livestock, property, and vectors of disease (US)
 - Over 8000 species that are considered minor pests (US)
 - Worldwide, there are over 3,500 major species of concern
- Cause damage by piercing, chewing, or sucking mouthparts.

Problem

Sources: Insects

- Six legged critters.
- Eight legged critters.



Problem Sources: Fungi

- Fungi
 - There are over 7,000 species recognized as pathogens of plants.
 - Filamentous, multicellular, reproduces by spores singly or in association with a variety of **spore bearing structures**.
- **Cause damage by direct penetration of plant cells and tissues.**

Disease Symptoms Caused by Fungi

- Aerial
 - Necrotic lesions
 - Vascular necrosis
 - Galls
 - Eruptive pustules
- Underground
 - Root rots
 - Girdling
 - Damping-off



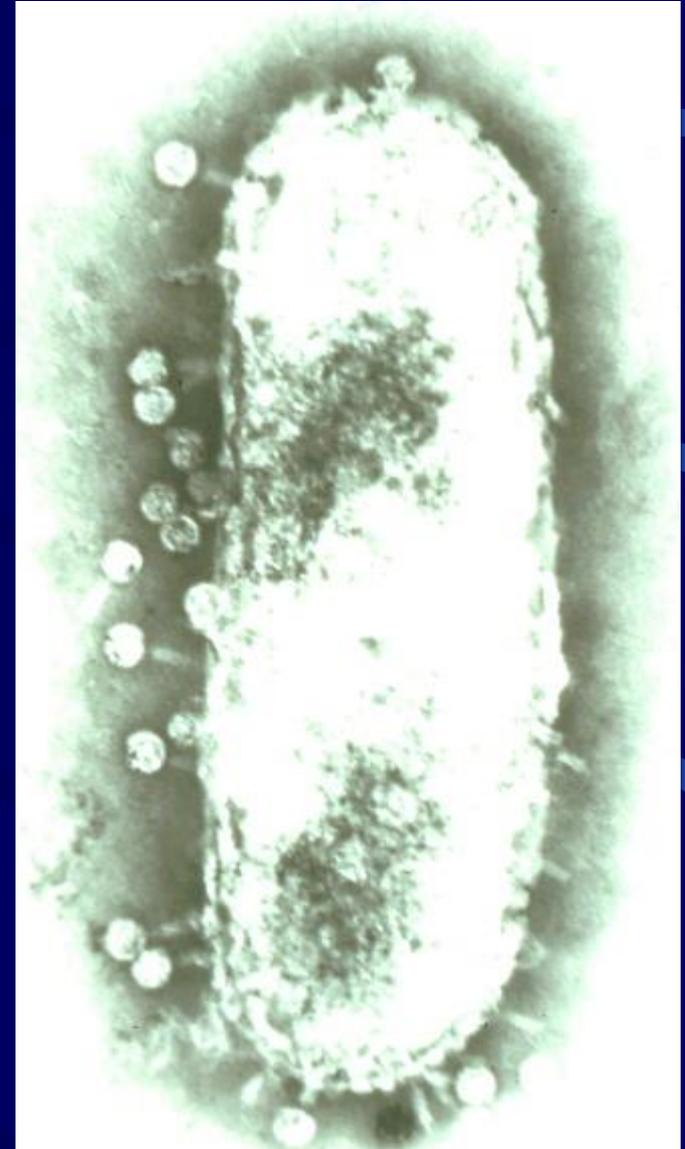
Fungi: Anthracnose

Anthracnose is found on many deciduous and evergreen trees and shrubs. Anthracnose results from infection by any of several different fungi, including *Apiognomonia*, *Discula*, *Gloeosporium*, *Glomerella*, and *Gnomonia* species, depending on the tree attacked. Infections are more severe in areas where prolonged spring rains occur after new growth is produced.



Bacteria

- Small, microscopic, single cell, organisms.
- Enters plants via wounds, natural openings.
- Many are seed-borne
- Control: Clean seed, clean tools, antibiotics, sanitation.



Bacteria

- Bacterial Canker - *Clavibacter michiganensis* subsp. *michiganensis*



Crown Gall

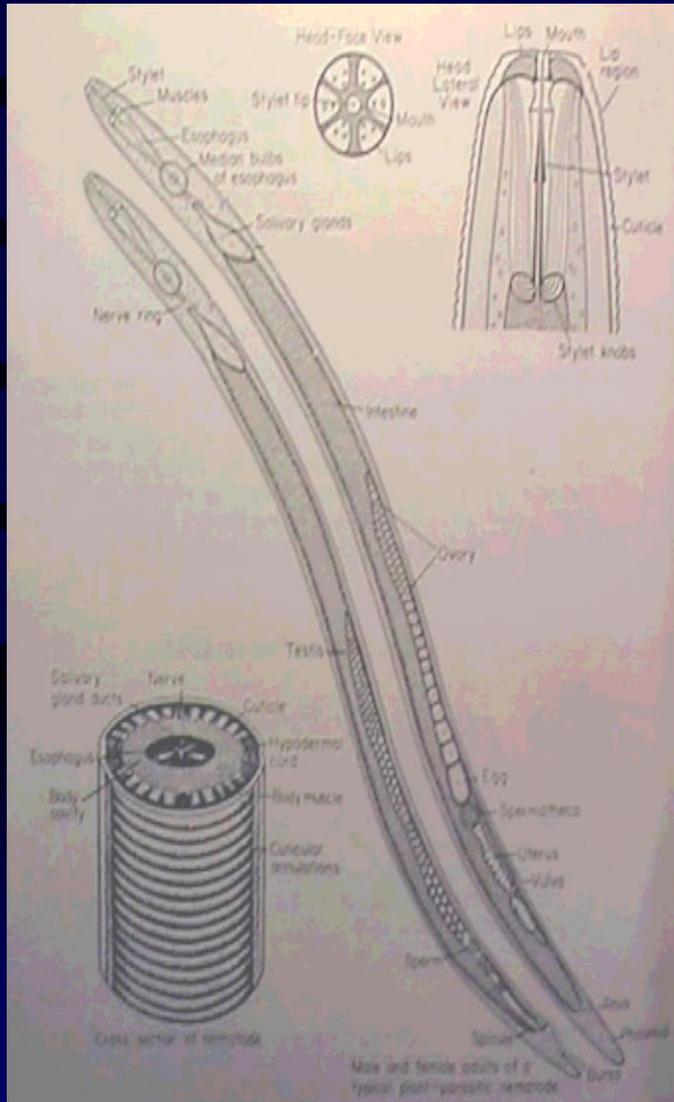
Agrobacterium tumefaciens



A. tumefaciens can produce subterranean, crown, and aerial galls on woody plants.

Problem Sources: Nematodes

Ubiquitous little creatures that occupy earth



- Small, microscopic, non-segmented worms.
- Parasitic ones have a stylet
- Saprophytic ones do not
- Control: Fumigants, very few chemicals, fungal and nematode parasites

Recognition of Nematode Damage



Nematodes: Root Knot

- *Meloidogyne* spp.



Problem Sources: Viruses

- Viruses
 - There are over 4,000 viruses separated into 71 families.
 - Two major groups, DNA, RNA
- Cause disease by entering plant cells and taking over genetic systems.



Viruses

- Small, submicroscopic
- Nucleic acid RNA or DNA
- Protein coat
- Vectors: Insects, nematodes, man
- Control: resistant plants, control insects, clean seed

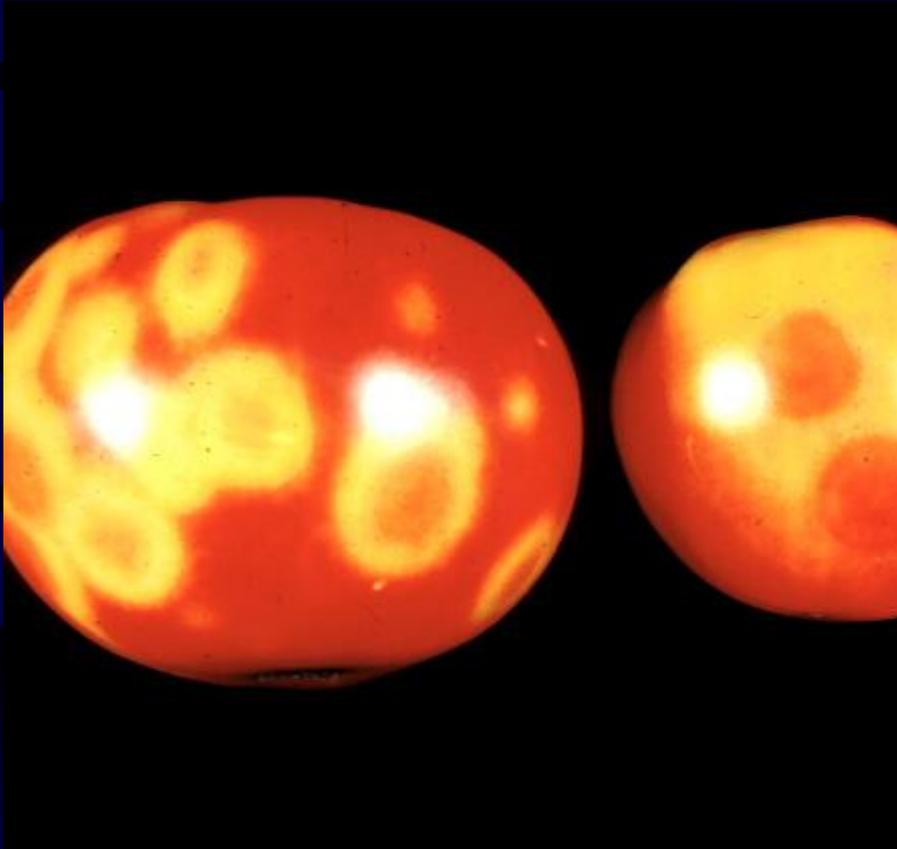


Viruses

- Most common symptoms: deformities, mosaics, mottles, rosetting.



Viruses



Tomato spotted wilt virus
in tomato



Tomato spotted wilt virus
in lettuce

Five Steps for Problem Diagnosis

1. Identify the host plant.
2. Examine the pattern of damage in the surrounding environment.
3. Note the pattern of damage or symptoms of individual plants.
4. Examine individual symptoms and signs.
5. Determine the possible cause.

Plant Problem Diagnosis Steps

- Note the pattern of damage in affected plants.
- Note signs and symptoms.
- Determine cause.



What You Need To Tell Us

If only plants could talk, but since they can't.....

- **Symptoms:** physiological reaction of the plant to the harmful activities of the primary causal agent.
- **Sign:** physical characteristics of the pathogen or pest that indicate the presence of the pathogen or pest.



Sick Plants Display Symptoms

- Blemishes or lesions (dead tissue)
 - Leaves, stems, flowers, fruit
- Reduction in growth
- Loss of color
- Abnormal growth
- Browning or yellowing
- Wilt
- Death



UC Statewide IPM Project
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Sick Plants May Show Signs

- A sign is a direct evidence of the presence of the pathogen or pest
 - Insect poop
 - Bacterial ooze
 - Cottony fungal growth
 - Nematode cysts



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**Useful
Websites for
Plant
Diagnosis**

Plant Clinic Resources & Recommendations Must be Science-based.

- .edu and sometimes .org extensions
 - Land-grant Universities
 - NRCS, Conservation Districts
 - USDA agencies
 - Xerces Society, etc.
- Science-based websites like "The Garden Professors".
<http://gardenprofessors.com/>



Resources

PNW Handbooks- Weeds, Diseases and Insects

WSU Hortsense- <http://pep.wsu.edu/hortsense/>

WSU Pestsense- <http://pep.wsu.edu/pestsense/>

WSU Gardening Page- <http://gardening.wsu.edu/>

UI Gardening- <http://web.cals.uidaho.edu/idahogardens/>