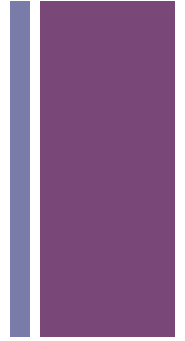


## Diagnosing Plant Problems

A strategy to get started

# + Causes of plant damage

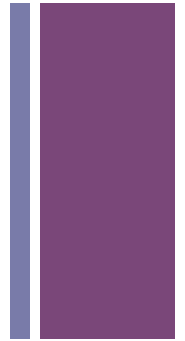


- Living factors
  - Pests such as insects, mites, rodents, mammals
  - Pathogens that cause disease such as fungi, bacteria, viruses, nematodes

# + Causes of plant damage

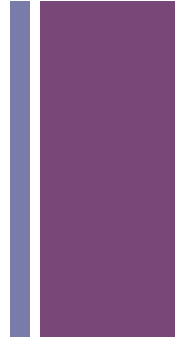
## ■ Nonliving Factors

- Mechanical factors such as breakage, abrasion
- Environmental factors such as temperature, light, moisture, oxygen, lightening, wind, vog
- Chemical factors such as fertilizer or pesticide excess, nutritional disorders



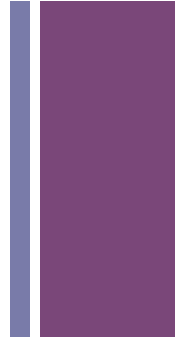
# + Use a systematic approach

- Define the problem
  - Closely examine the entire plant and others around it



## + Take note of symptoms

- If the plant has insects, examine the leaves with insects on them
- Do they have brown or yellow spots, holes, chewed edges?
- Are they turning pale green or yellow?
- Is there more than one kind of insect present?

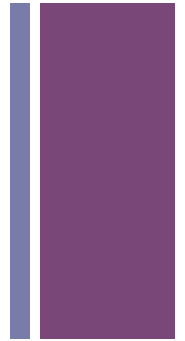


# + Look for patterns

- Do other plants have the same problem?
- Are they all in the same place or different locations?
- Are they all the same type of plant?

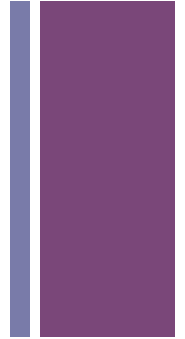
If different types of plants are all showing the same damage, it can indicate nonliving factors.

Damage to a few species of plants or only to plants that are the same can indicate living factors.



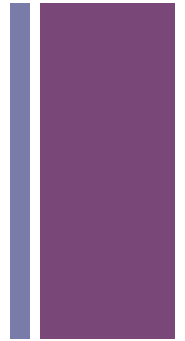
# + Where is the damage occurring on the plant?

- Are the symptoms exhibited throughout the plant or localized?
- When the tops of plants wilt or die, it often means there is a problem with the root system.
  - This can be from mechanical damage, root rot or insects feeding on the roots or from lack of water or too much water, soil compaction or root damage from construction activities.



## + Examine spread of problem

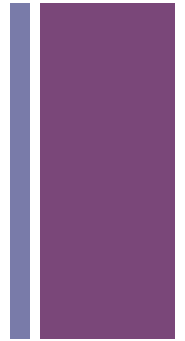
- Is it spreading gradually?
  - This can mean it is due to living factors.
- Does the problem occur quickly and remain in a particular area or plant?
  - This can mean a nonliving factor.
  - However there are a few plant diseases that can kill a plant quickly (verticillium wilt, etc.)





+ Determine the likely cause of damage

- Is it due to living or nonliving factors?



# + Living factors? Disease pathogens

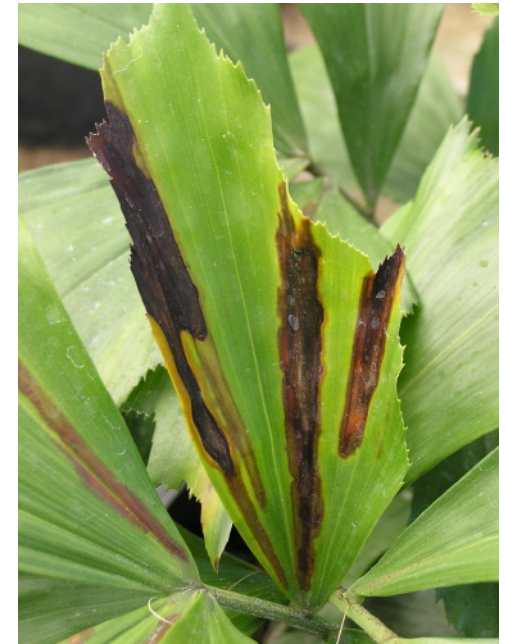
## ■ Fungal pathogen symptoms:

- Round leaf spots
- Stem rots with a dry/papery texture
- Concentric rings
- Discoloration
- White or black fuzzy growth
- Wilt



# + Living factors: Disease pathogens

- Bacterial disease symptoms
  - Galls (swollen areas)
  - Irregularly shaped leaf spots
  - Wilting (then yellowing and dying)
  - Rot (often a wet rot, may or may not smell bad)



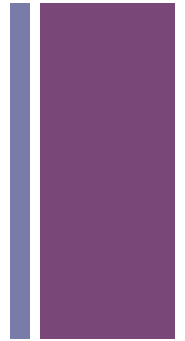
## + Living factors: Disease pathogens

- Viral pathogen symptoms
  - Inhibit chlorophyll formation resulting in yellowing or mottling
  - Stunting
  - Distortion
  - Dieback of part of the plant



## + Living factors: Disease pathogens

- Nematodes are microscopic roundworms that cause disease-like symptoms
- Stem nematodes feed on stems and cause shortenings of internodes



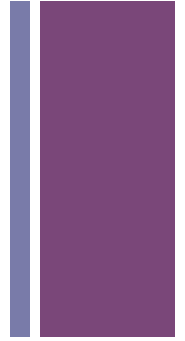
## + Living Factors: Nematodes

- Root nematodes feed underground, damaging the root system which shows up as wilting and stunting
- Foliar nematodes cause angular leaf spots



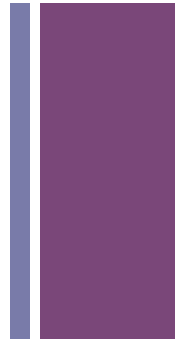
## + Living Factors: Insect Damage

- Chewing/rasping  
insects feed on plant  
tissue
- Ragged/chewed holes in  
leaves
  - Caterpillars, slugs,  
beetles, grasshoppers



# + Living factors: Insect Damage

- Rolled leaves
  - Leafroller caterpillar
- Tunnels in between upper and lower leaf surfaces
  - Leafminers
- Holes in stems, branches or trunk; sections of trees dying or yellowing
  - Wood borers





## + Living Factors: Insect damage

- Girdled or dead stems
  - Cutworms, twig girdlers, stem borers
- General decline of plants due to root damage
  - Soil-dwelling insects



## + Living Factors: Insect Damage

- Sucking insects feed on plant fluids and often inject toxins into the plant
  - Removal of chlorophyll and/or injection of toxins can cause leaf spotting or stippling
    - Aphids, leafhoppers, spider mites
  - Leaf distortion such as curling or puckering
    - Aphids, leafhoppers, thrips, mites



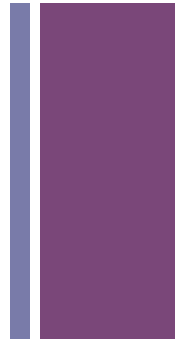
## + Nonliving Factors: Mechanical

- Symptoms are broken or girdled stems or roots, bruised or broken leaves, damaged bark
- Often caused by weed trimmers and lawn mowers, “tractor blight” on farms
- Abrasion from wind damage or rubbing



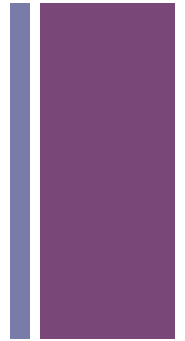
## + Non-Living Factors: Physical

- Environmental extremes: too cold
  - Rare to see frost damage in Hawaii but it can happen at higher elevations
  - Symptom is the death of exposed tissue, “frostbite”
  - Container plants can get blackened or spongy roots with lack of new growth or root hairs



## + Nonliving Factors: Physical

- Rapid change from low light to high light intensity or vice versa
  - Can cause yellowing of leaves, reduced growth, leaf drop or death
- Too little light
  - Reduce, delay or prevent flowering
  - Very lanky, sparse growth

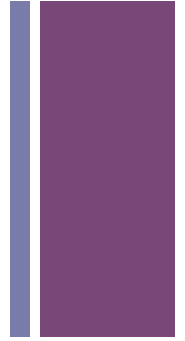


# + Nonliving Factors: Physical

- Excess heat
  - Scorch symptoms on leaf tips and interveinal areas
  - Leaves shaded by other leaves and shady side of plant may not be affected
  - Often will affect all plants in an affected area



## + Nonliving Factors: Physical



- Drought and waterlogging
  - Chlorosis (yellowing of leaves)
  - Abscission (shedding older leaves)
  - Wilt
  - Waterlogging causes oxygen deficiency leading to a halt in root growth & metabolism, death of roots and wilt

# + Non-Living Factors: Chemicals

## ■ Inappropriate use of pesticides and fertilizers

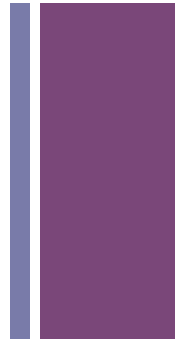
- Leaf burn
- Distortion
- Chlorosis
- Bleaching
- Damage can follow application patterns





# + Non-Living Factors: Nutrient Deficiencies & Excesses

- Depending on what is missing/in too much supply:
  - Yellowing, especially older leaves
    - Not enough nitrogen
  - Death of older leaves
  - Death of new growth
  - Tip burn/scorched edges of leaves

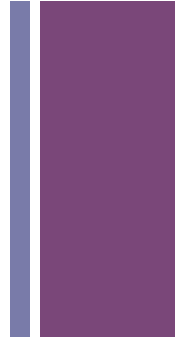


# + Non-Living Factors: Nutrient Deficiencies & Excesses

- Stunting
  - Boron and calcium deficiency

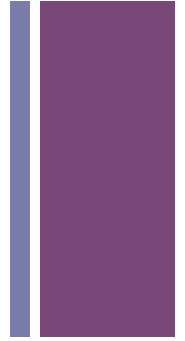


## + Using The Internet



- CTAHR web site
  - Needs a MUCH better search engine.
  - Good to use if you already think you know what the problem is.
  - Look up under name of pest or host plant.

# + Using the Internet



- UC Davis IPM Program

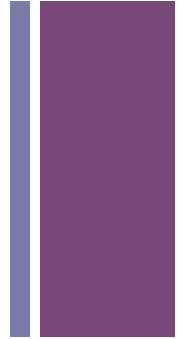
- Home Garden section:

- [http://www.ipm.ucdavis.edu/PMG/  
menu.homegarden.html](http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html)

- Agricultural pests section:

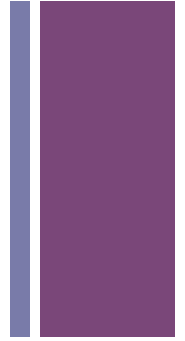
- [http://www.ipm.ucdavis.edu/PMG/  
crops-agriculture.html](http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html)

## + Using the Internet



- The Master Gardener's Web Guide
  - Great compilation of web sites by Kendal Lyon

# + Using the Internet



- Scot Nelson's web site
  - <http://sites.google.com/site/scotnelson/>
  - Wonderful photos & descriptions

## + Acknowledgements

- Thanks to the Virginia Cooperative Extension for the use of their publication, “Diagnosing Plant Problems,” which this talk was based on.
- Thanks to Scot Nelson’s web site for many of the photos used in this presentation for examples from Hawaii.

