Distinguishing Disease and Insect Problems from Environmental Stresses

Biotic versus Abiotic

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Integrated Pest Management Update 2011

Photos: H. Glenn, UF/IFAS (unless otherwise noted)

Plant Problems

Abiotic

- Non-living (environmental stresses, physiological and other nonbiological factors

Biotic

- Living organisms (Insects, pathogens, weeds, nematodes, parasitic plants, viruses)

Whatever the cause of the problem or damage, accurate diagnosis is necessary to solve the problem

Diagnosing Problems in the Landscape

- Many abiotic and biotic agents can cause injury
  - Become familiar with common causes of damage
- Landscapes exhibit tremendous variability
  - Diversity in plants, soils, environmental conditions
  - Diversity over time
  - Landscapes are dynamic

Diagnosing Problems in the Landscape

- A problem can have multiple or interacting factors
  - Individual factors may cause injury alone or in conjunction with other factors
- Chronic problems may express subtle symptoms
  - Symptoms may not be obvious (i.e. slow growth)

Abiotic Disorders

- Water issues
- Aeration
- Nutrient deficiencies
- Salinity
- pH
- Temperature
- Sunburn
- Light
- Wind
- Pollution
- Lightening
- Root girdling
- Mechanical injury
- Pesticide phytotoxicity

Similarities in Abiotic and Biotic Plant Problems

- Your plant is chlorotic and dropping leaves
- Could it be caused by:

Excess Fertilizer

Insect

Temperature Extreme

Lack of Water

Disease

- Any of these as well as others could be the problem

Biotic Injury

- Other evidence (i.e. presence of an insect, cast skins, frass, fungal spores, etc.
- Biotic injury may spread progressively in a plant or to other plants
- Some biotic problems are specific

Abiotic Injury

- Physical evidence not usually on the plant (i.e. wind damage, herbicide damage, etc)
- Does not usually spread
- May affect numerous plant species

Diagnosing the Problem

- Plant identification
- Identify the symptoms
- Inspect the entire plant
- Inspect the site
- Look for patterns
- Management history
- Test likely causes

Wilting - Browning

- Lack of water or inability to take up water
- Low temperatures
- Biotic agents (microorganisms, nematodes, insects)

Cold damage to banana

Wilting - Browning

- Plant type - Avocado
- Small holes in trunk
- Dark “bluish” streaking

Laurel Wilt Disease

Necrosis (death)

Phytotoxicity from a Fungicide (Daconil)

- Water deficit
- Salt toxicity
- Nutrient deficiency
- Pollution
- Temperature extremes
- Pesticide toxicities
- Biotic agents (i.e. microorganisms, nematodes, insects, mites)

Chlorosis (Yellowing)

- Mottling or irregular patterns; stippling; bleaching
- Biotic agents (i.e. microorganisms, viruses insects, mites); nutrient deficiencies

Chlorosis (Yellowing)

- Palms - good example of specific yellowing patterns due to nutrient deficiencies

- Magnesium deficiency in *Phoenix canariensis* showing broad yellow bands along the margins of the oldest leaves. (Photo: T. Broschat, UF/IFAS)

Necrosis - Yellowing

- Pay attention to patterns within and among plants
  - Marginal (leaf edges)
  - Size and appearance (blotches, spots)
  - Inteveinal (tissue between veins affected)
  - Speed of appearance or spread

Water Soaking - Lesions - Edema

- Changes in moisture and or temperature
- Biotic agents (i.e. microorganisms, viruses insects

Distortion

- Other symptoms often accompany distortion (chlorosis, necrosis, etc)
- Herbicide damage
- Other pesticide toxicity
- Low temperatures
- Insects and mites

Pink hibiscus mealybug

Distortion

Defoliation

- Host plant
- Low temperatures
- Herbicide damage
- Deficiency in water, aeration
- Pollution
- Insect, diseases
- Timing and speed of defoliation

Bleeding and Gumming (the flow of sap)

- Water deficit
- Mechanical injury
- Diseases (canker, fungi, bacteria) insects

Plant Galls

- Extremely variable in location, size and shape
- May or may not be damaging to the plant
- Abiotic origins
- Biotic causes include disease organisms, nematodes, insects and mites

Plant Galls

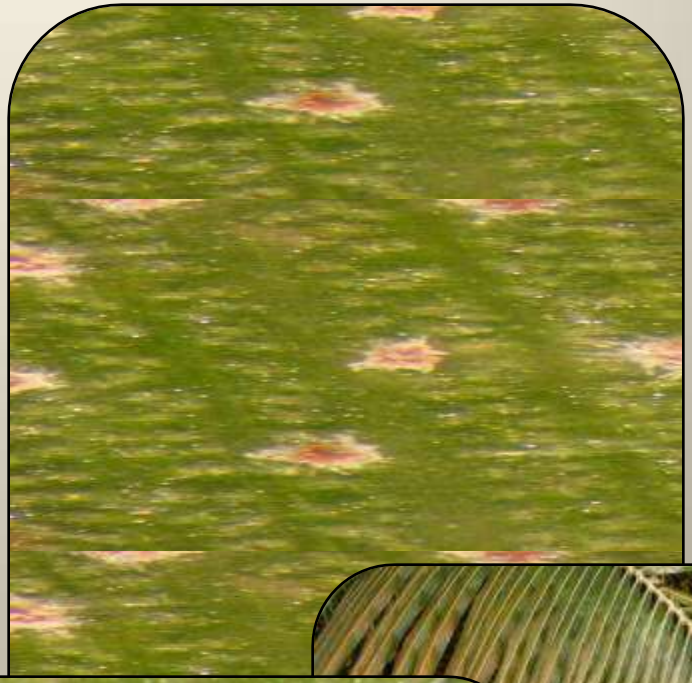
Other Types of Damage

Weed eater or lawn mower damage

Damage from power lines

Other Types of Damage

Rat damage



Plant Structure

ed Palm Mite

Other Types of Damage

Cannonball fungi

Webbing
from psocids

Other Types of Damage

Ascheroni sp.

(entomopathogenic fungi)

Lightening damage

Secondary Pests

Abiotic factors often weaken plants making them more susceptible to biotic factors

- For example overwatering can lead to root disease
- Wood boring insects common secondary pests

Expect Additional Problems when Plants Have Been Severely Stressed

Diagnosing Plant Problems

- Detective work
- Familiarity with common problems
- Step by step rule out known causes
- May need tests conducted by professionals
  - Bioassays for diseases, nematodes
  - Soil and water
  - Insect Id
- Use your resources

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