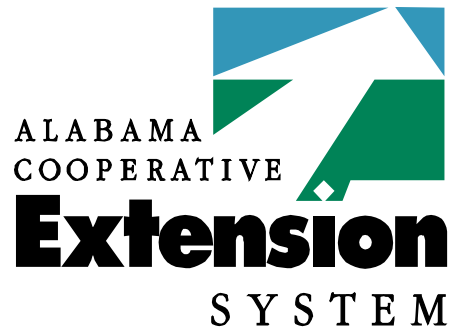


CSI – Southeast Plant Diagnostics



*Alabama A&M and
Auburn Universities*

Presented By:
Tony Glover
Regional Extension
Agent – Birmingham
Alabama

CSI - Plant Diagnostics

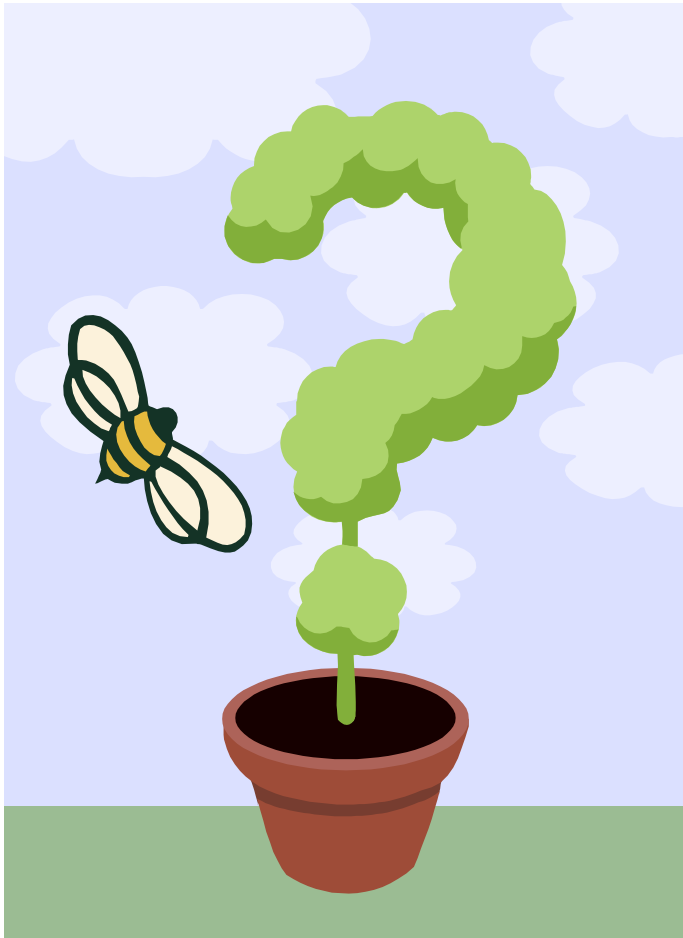
- Involves real detective work

Who?
What?
Where?
When?
Why?



How planted?
Type of plant?
Site - soil?
Origin of plants?
When planted?
Recent weather?
Recent activity?

Some Guiding Principles



- Ask lots of questions before giving a response
- Avoid jumping to conclusions
- Try to determine if a real problem exist
- How does the plant differ from a healthy plant of that species/cultivar?

What is Normal

- Always compare the plant of concern with a healthy or normal plant
- Normal plant parts or seasonal changes are sometimes mistakenly assumed to be evidence of disease.



Spores on fern
could be mistaken
for a very neat pest

What are They Describing

- “My pecan tree has thousands of green worms hanging from the branches. This is the first spring I have seen this problem.”



What question
should we be asking

Line of Questioning

- Have you seen these “worms” close up? “No”
- Can you reach them to examine? “Too High”
- Do they seem to be eating foliage? “Can’t tell but doesn’t look like it”
- How old is this tree – has it made a pecan crop in the past? “8 years old – no it has never made a pecan”



Any Ideas
out There?

Example of a Perceived Problem

- This was a real question I had.
- Turned out to be the male flower – Catkin
- You may get this question about other normal plant parts. (ex: fruit of arborvitae or red cedar, etc)



Pest May Be Confused With Plant Parts

- My junipers are looking really bad – the foliage is very thin.
- They have small cones all over the plant but I don't see any bugs.



What do you think?

Bagworms vs Fruit

- The cone like items are actually the protective bag of the bagworm
- Junipers produce a berry like small fruit



How Do I Know What To Ask?

- A good place to start is with your states Extension Plant Problem Submission form – The questions on the form can help you get started asking the right questions.



Please fill out the following form. You cannot save data typed into this form. Please print your completed form if you would like a copy for your records.

PLANT INFORMATION

Plant Part Affected

- flower
- fruit
- limbs
- leaves
- roots
- stem or twig
- crown (stem area at soil line)

Problem Severity

- light
- moderate
- severe

General Appearance

- abnormal growth
- leaf spot/blight
- leaf edge scorch
- stunted
- wilted
- yellowed
- cankers (stem lesions)
- rots
- dieback
- boring injury
- chewing injury
- other

Problem Distribution in Field

- entire planting
- in spots or localized areas
- scattered plants
- certain variety
- in low areas
- upland areas
- other

FOR ORNAMENTS ONLY

- How long at this site?
- Height of plant
- How many plants affected?
- How many plants (same type) not affected?
- How watered?
- Watered how frequently?
- Type fertilizer applied

- Fertilizer rate & schedule
- Location: full sun full shade
- Relation to nearest construction (feet)
- Relation to roadside (feet)
- Present maintenance program (sprays, mulch)
- Planting date
- Size of planting: acres p

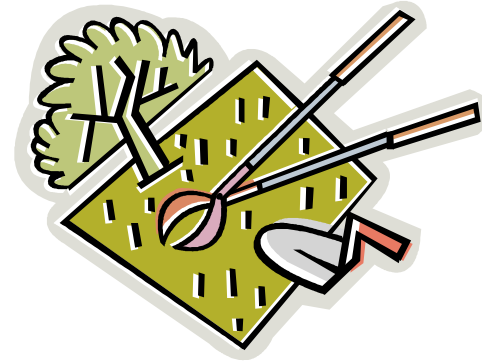
Don't Give Up To Quickly

- Ask lots of questions that cannot be answered – yes or no
- Take good notes while talking
- Repeat what they said back to them for clarity
- Tell them you will research the question and call them back later
- Then – Just do it!!!



What if a Verbal Description is Not Enough

You may need to coach a client on collecting a good sample to bring in. Photos are helpful when done correctly and may help avoid a trip to the office.



Taking a Good Photo

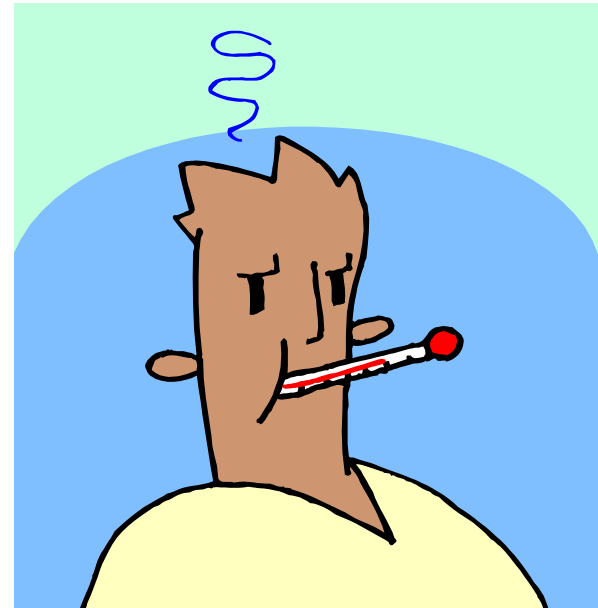
- Only quality photos are helpful
- Place something of known size in the picture
- Take close ups using the close up setting on camera (place item in photo for size comparison)
- Show good and bad areas and the transition zone
- Take multiple photos of plants showing close up, intermediary, and distance views
- Multiple angles – also show base of plant with mulch pulled back – trunk from various angles



Some Guiding Principles

(once it is determined a real problem exist)

- Remember (just like with human health) there may be multiple things causing a given symptom but signs are more definitive



Symptom vs Sign

Learn the difference and look for both

Symptom

- Changes in growth
- Changes in appearance
- Dead plant parts
- Etc

Symptoms are not definitive
and usually very general!



Sign

- Evidence of a pathogen
- Insect or other pest
- Observed mechanical damage
- Chemical residue
- Secretions from the plant
- Damage pattern
- Recent weather records (severe freeze, late frost, hail storm, etc)

Some Guiding Principles

- Many plant problems start at the root level – often related to transplanting and after care (especially with young plants – 3 years or less).
- Always ask age of plant. When was it planted?

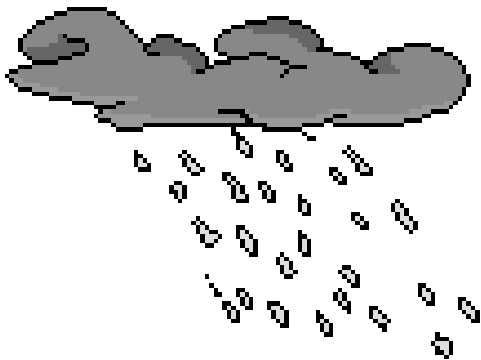


Two Sources of Plant Problems

- Abiotic

Non-living

sources



- Biotic

Living sources



Some Guiding Principles

- 80 % of woody landscape plant problems are abiotic vs 20% biotic



Some Guiding Principles

- 80 % of woody landscape plant problems are abiotic vs 20% biotic
- Moisture problems make up 70% of abiotic problems on young woody plants



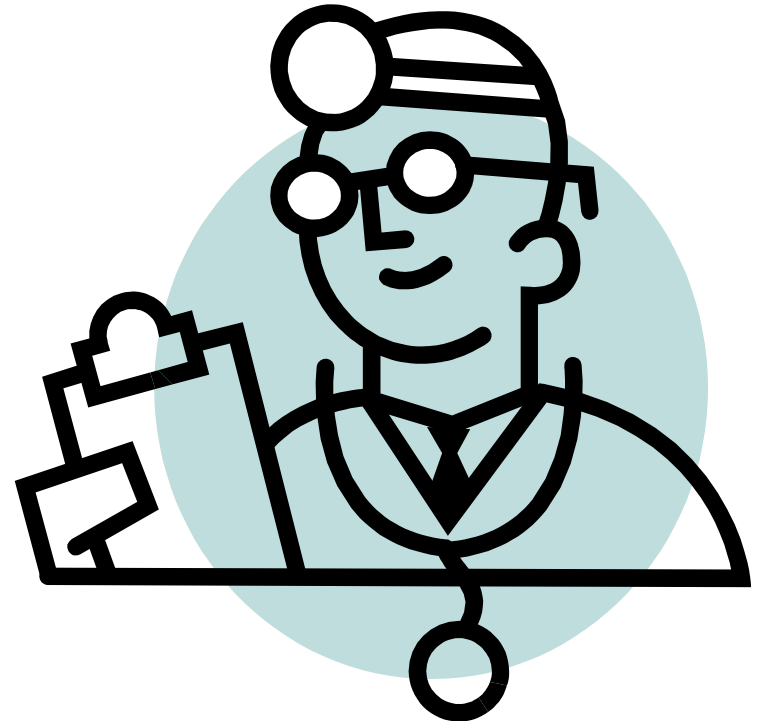
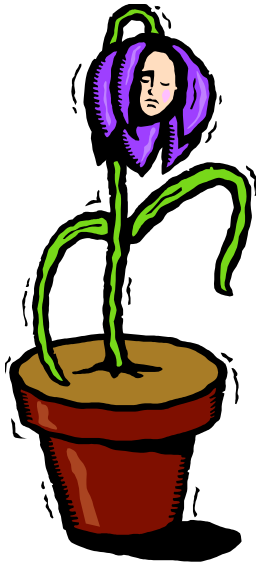
Some Guiding Principles

- 80 % of woody landscape plant problems are abiotic vs 20% biotic
- Moisture problems make up 70% of abiotic problems
- 91.2% of all statistics are made up on the spot



Abiotic Causes of Plant Problems

- Water – is really the number one issue

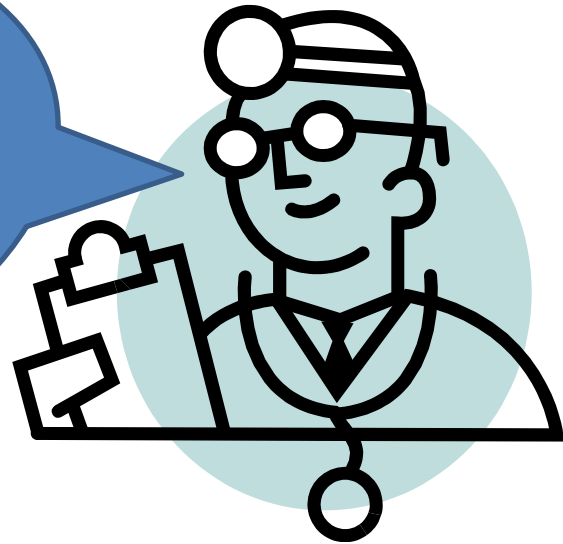


Abiotic Causes of Plant Problems

- Water – is the number one issue



You are dying
because of too much
or maybe not enough
water



Abiotic Causes of Plant Problems

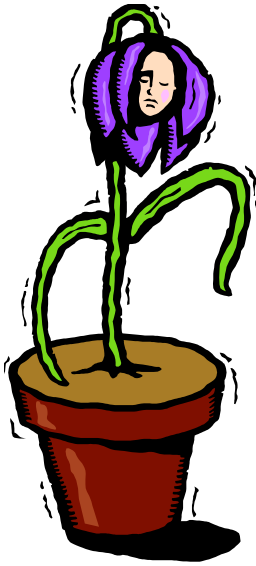


You are dying
because of too much
or maybe not enough
water

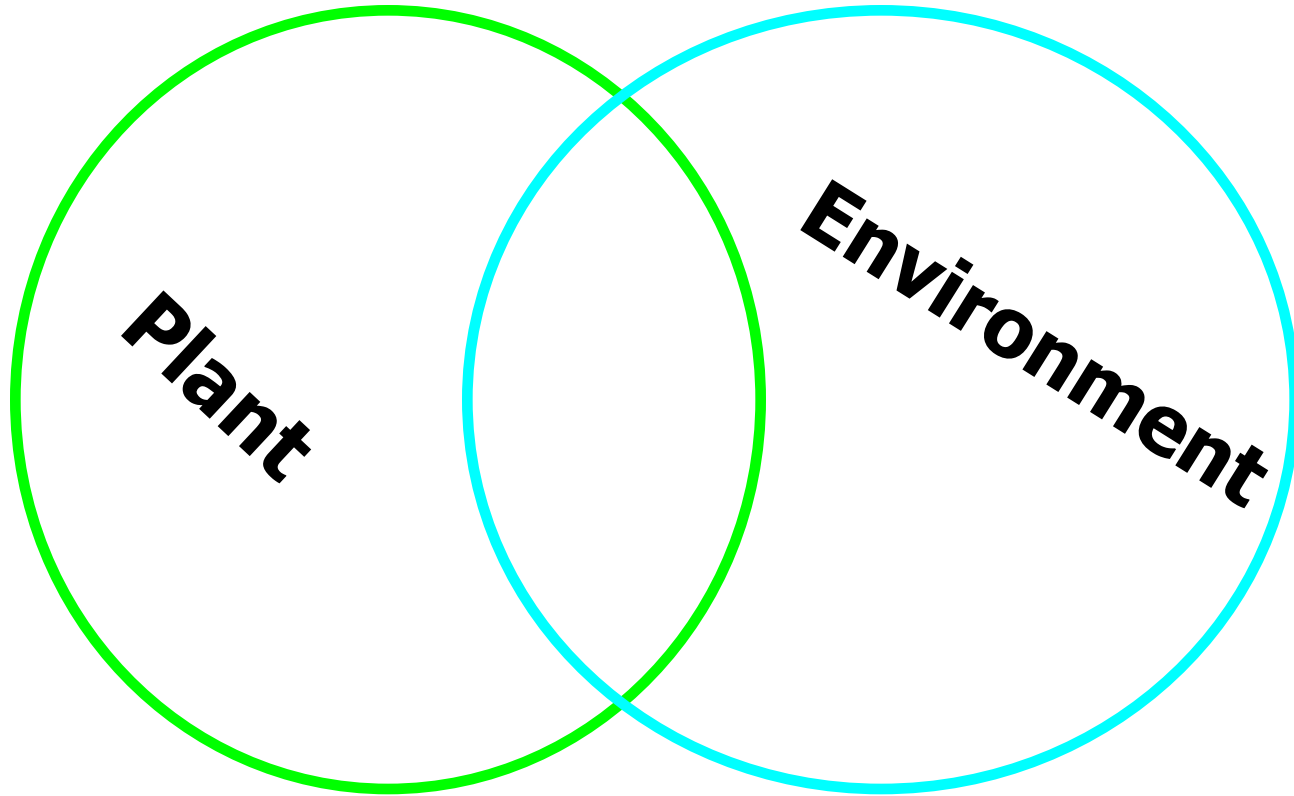
Or too much or
not enough light



Abiotic Causes of Plant Problems



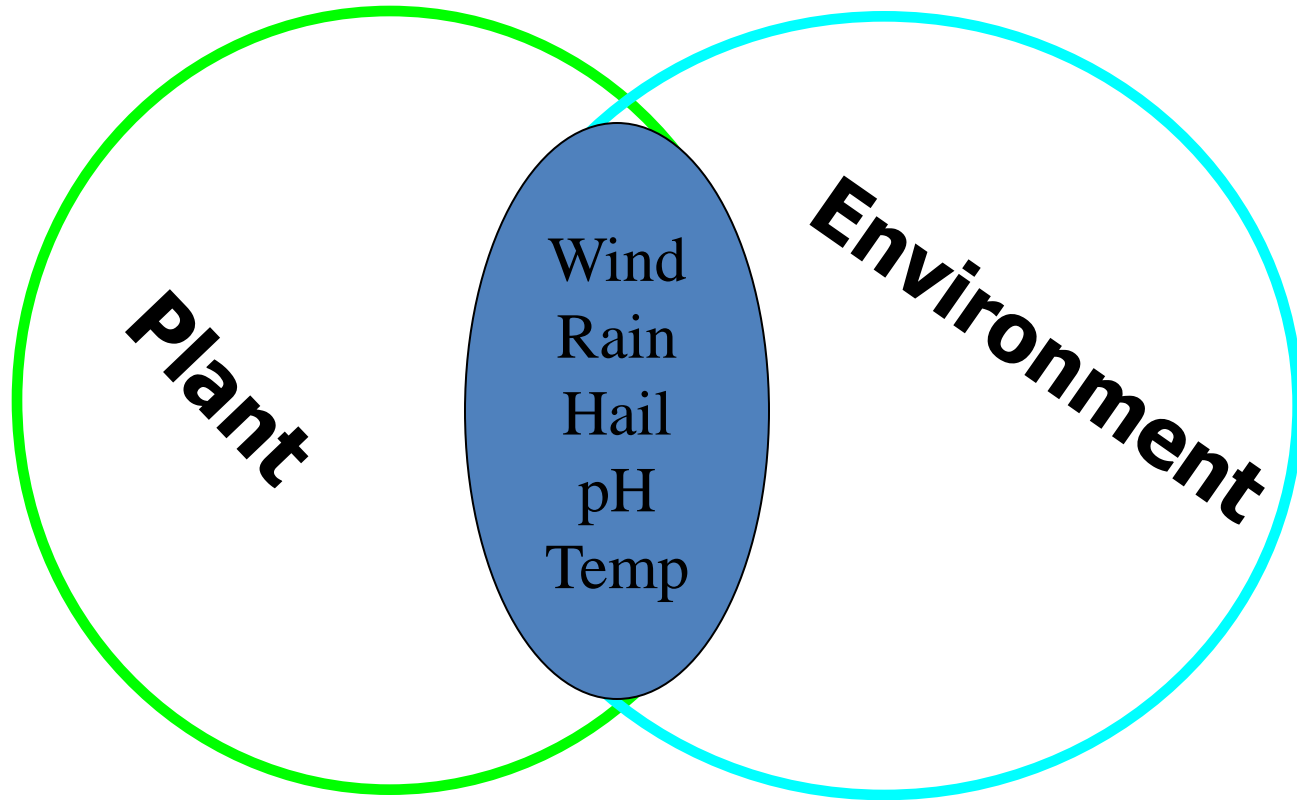
Abiotic Problems



How the plant interacts with the environment

However: Abiotic problems may lead to biotic problems

Abiotic Problems



How the plant interacts with the environment

Remember: Abiotic problems may lead to biotic problems

Abiotic Causes of Plant Problems

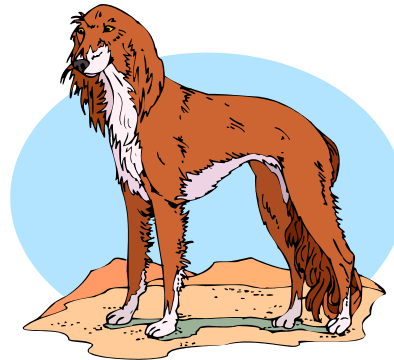
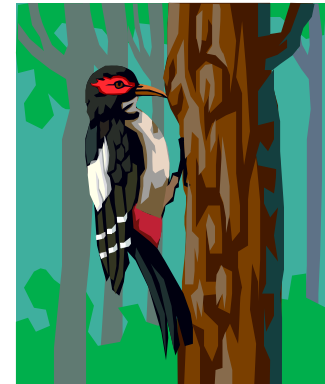


Examples Include:

- Temperature (extremes and rapid change)
- Site problems (soil type, topography)
- Nutritional deficiencies
- High soluble salts (excessive fertilizer)
- pH (too alkaline or too acidic)
- Pesticide (improper application, drift or contaminated compost/soil)
- Compaction issues
- Air pollution
- Sunburn or sunscald
- Light issues
- Other weather – wind, lightning, etc
- Hail damage
- Compromised root - girdling, trenching, etc
- Mechanical injury
- Etc, etc, etc

Biotic Problems

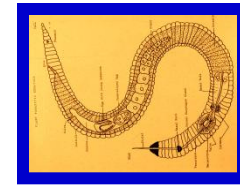
- Disease causing organisms
- Insects
- Mites
- Pets
- Birds
- Other critters
- People



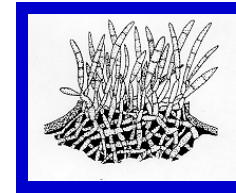
Biotic Pathogens of Plants

Living

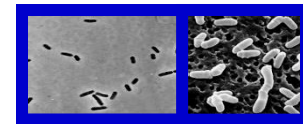
Nematodes



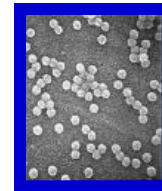
Fungi



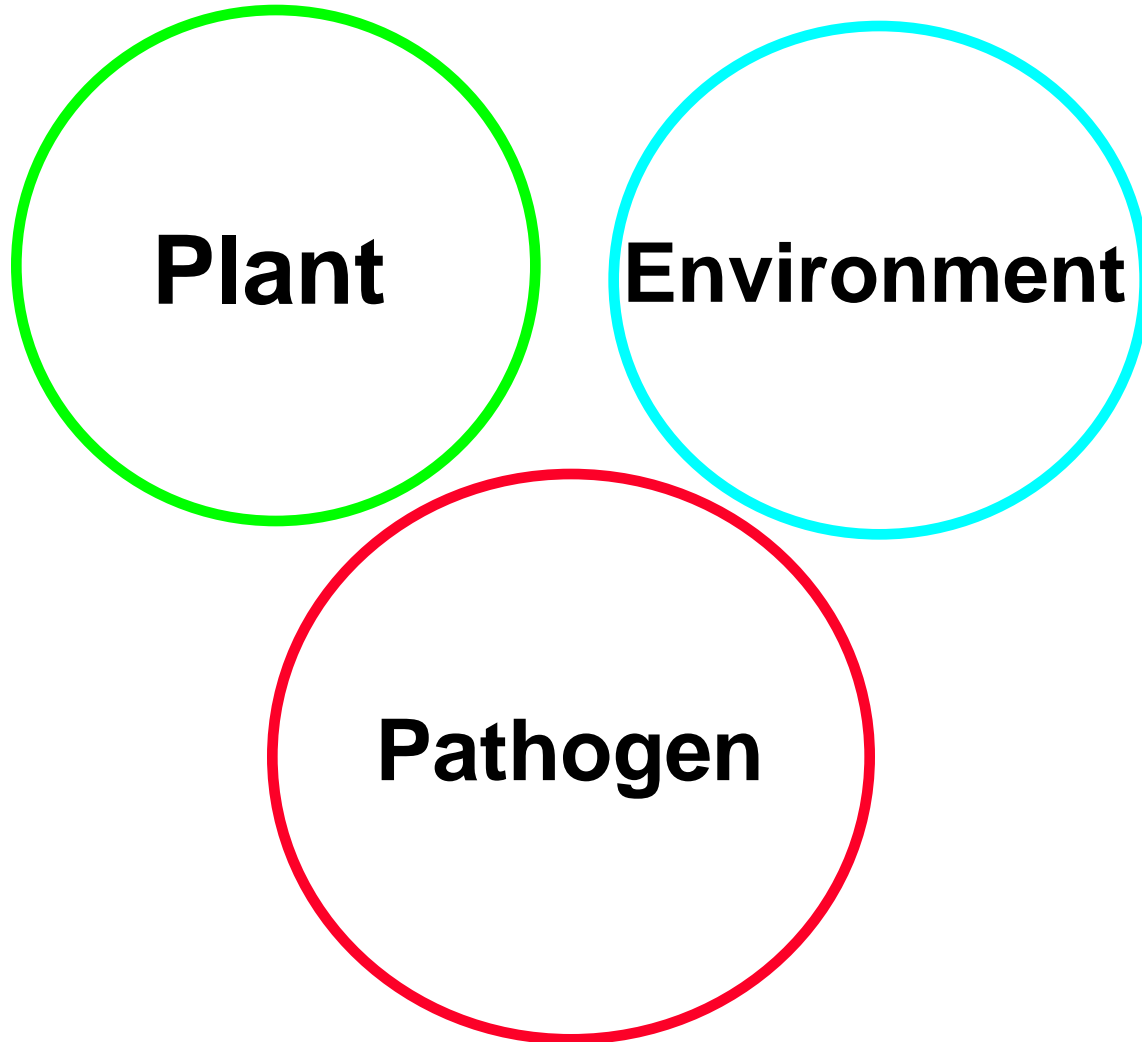
Bacteria



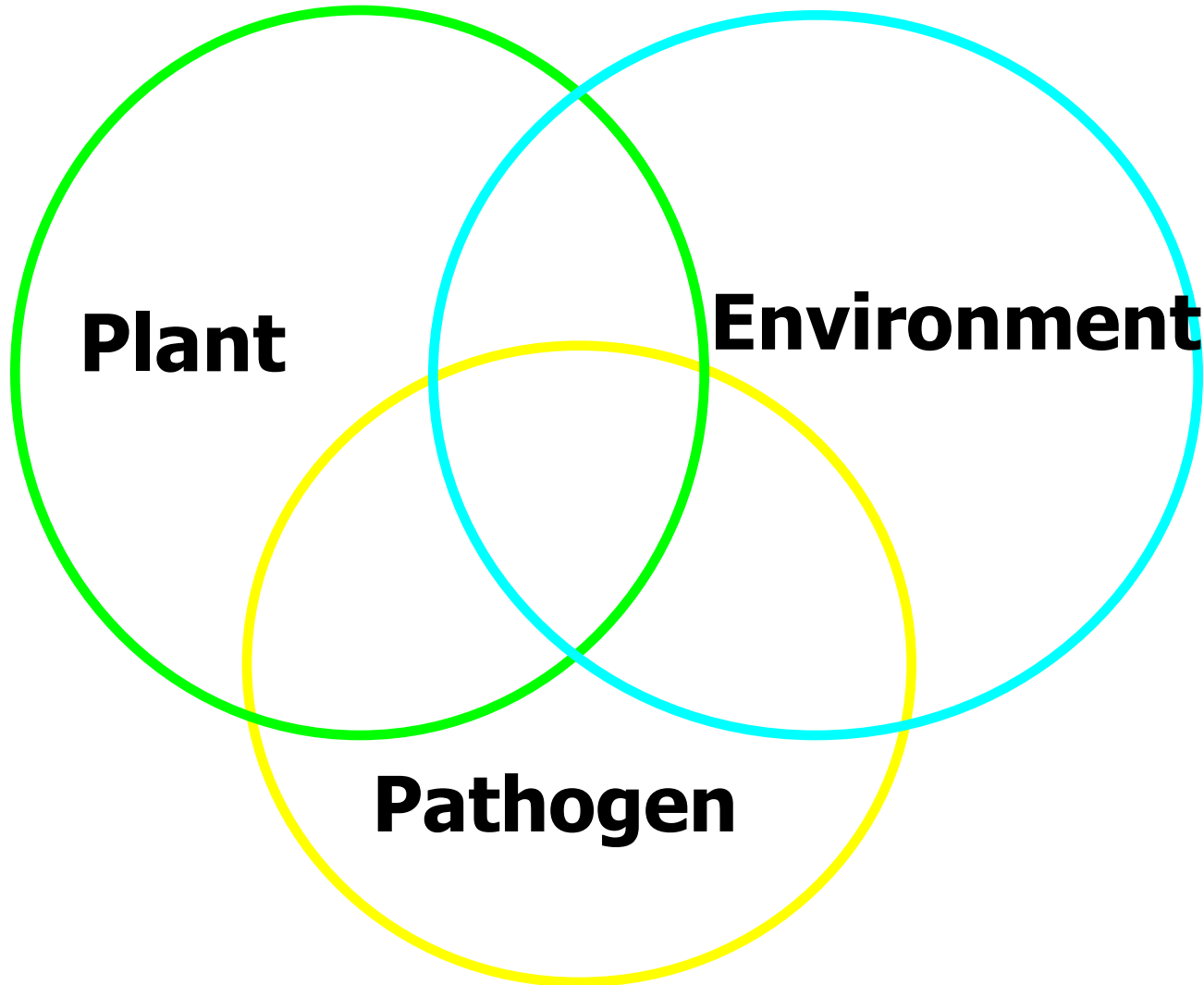
Viruses



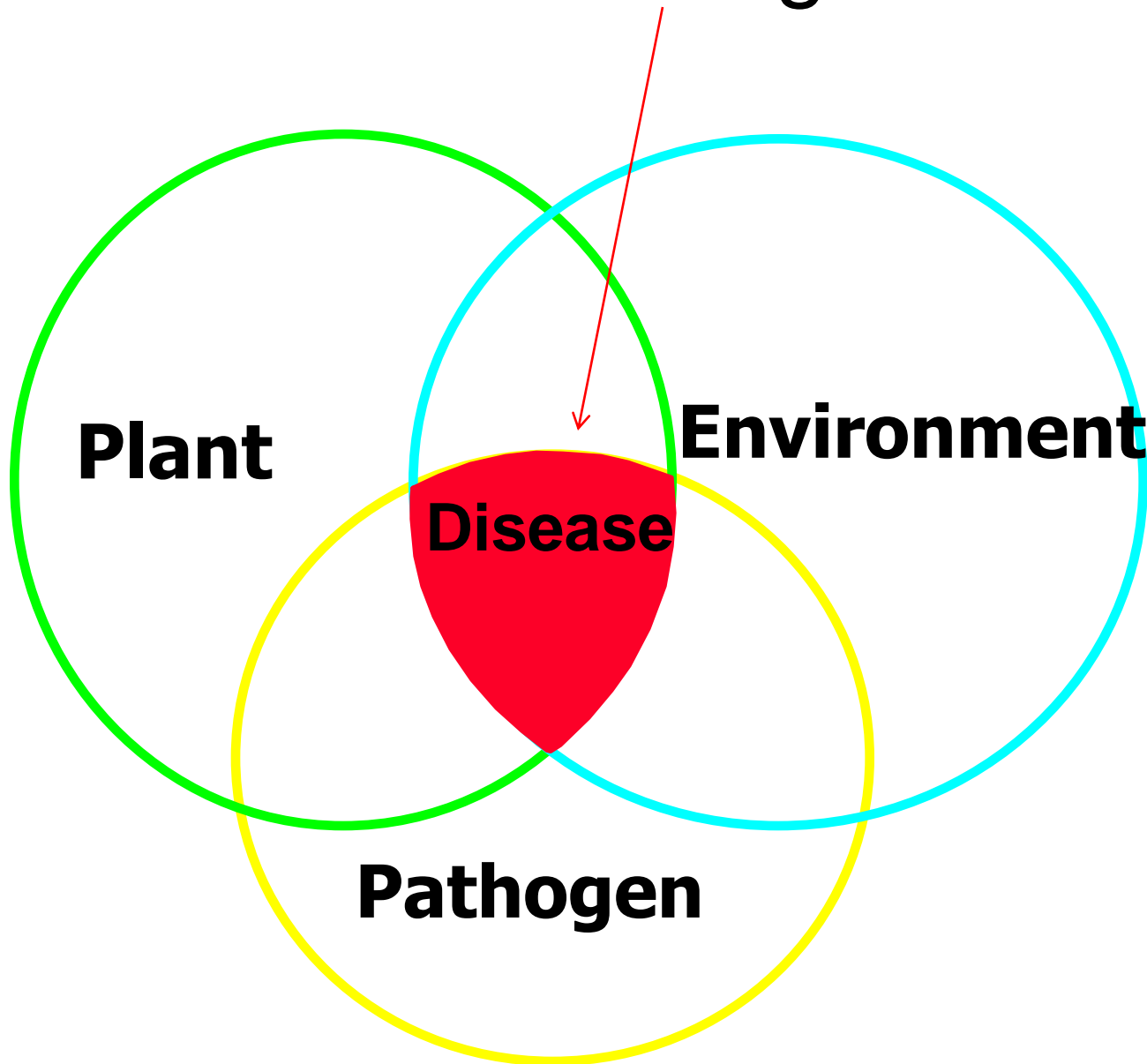
Plant 'Disease Triangle'



'Intersection of all three'



'Disease Triangle'



Abiotic vs. Biotic Problems

Symptom Progression

- Biotic disease – symptoms usually progress and nearby plants of the same species may become infected in time.
- Abiotic disease – generally does not show signs of progression and does not spread.
 - Exception – nutritional deficiency symptoms may progress slowly mimicking a disease



Abiotic disease – Herbicide Injury
May look like a viral disease but does not progress or spread to other plants or plant parts

Review: Steps in Problem Diagnosis

- Know the plant (for common problems and to determine if there is a problem)
- Determine age of planting
- Recent changes (light, water, temps, etc)
- Look for patterns (get photos if possible)
- Look for symptoms or signs
- Examine cultural practices (mulch, fertility, herbicides, etc)
- Identify as many potential causes as possible
- Consult resources and try to reach a diagnosis

Steps in Problem Diagnosis

Know the Plant (or learn about it)

- Identify the species and if possible the cultivar affected
- Know what problems commonly affect the species.
(check Extension pubs, Ortho Problem Solver, Southern Living Answer book, Internet, etc)
- For example:
 - Red Maple – Phyllosticta Leaf Spot, gloomy scale
 - Flowering Dogwood – Powdery mildew, spot anthracnose
 - Leyland Cypress – Canker diseases
 - Pear - Fireblight

Does this look like a disease, insect pest or herbicide damage?



Do you know the plant?

Does this look like a disease, insect pest or herbicide damage?



Know the plant:
Leopard plant – Ligularia
Knowing the plant is a
major clue

Know The Plant

Is this a problem?

Questions to ask:

- What plant (white pine)
- When noticed (fall)
- Where on the plant (interior needles only)



Know The Plant

Is this a problem?

Questions to ask:

- What plant (white pine)
- When noticed (fall)
- Where on the plant (interior needles only)



Know the plant growth habit:
pines commonly lose some
interior needles in the fall

Steps in Problem Diagnosis

If possible examine the plant or view photos or at least ask the client to gather more info:

- Look at the whole plant or at least get a description of it when possible (foliage, trunk, stems, branches, leaves)
- Examine the roots or rooted area (If you can't see the root you may be able to examine the area the root occupies and the trunk as it enters the ground)
- Note the color, size, and thickness of the foliage
- Check the trunk and major branches

Steps in Problem Diagnosis

- Determine prevalence of problem.
 - Large area, all plants, multiple species impacted – generally points to abiotic cause.
 - Scattered, localized damage or symptoms – generally biotic.



In this case an ammonia gas was accidentally released in the area and burned the foliage of all plants in the bed

Steps in Problem Diagnosis

Look or ask about patterns

Patterns of damage are excellent **signs** and are definitive diagnostic clues.

– Check for distribution of **symptoms**.

- Uniform – generally abiotic.
- Random – generally biotic.

Marginal frost damage on bermudagrass – interesting but uniform pattern



Observation of Field Patterns

Random pattern often indicates biotic problems but nutrient deficiency or poor planting may cause a false assumption (how long planted?)



Boxwood Phytophthora Root Rot
Biotic condition shows randomness



Oak - Nutrient Deficiency
Deficiencies are usually gradual and
Does not always indicate a soil deficiency.
Planting problem may lead to a deficiency

Observation of Field Patterns



What do you think?

Observation of Field Patterns



**Case File
msw-1984**

Random Damage



Dogs are biotic pest – urine spots

Steps in Problem Diagnosis

Look or ask about patterns

- Is the damage limited to one species?
 - One or related species – often biotic
 - Multiple plant species - often abiotic (example: freeze damage or herbicide drift)



Fireblight on pear

Observation of Field Patterns

Random vs. Uniform



Random



Uniform

Observation of Field Patterns

Random vs. Uniform



Random Patches - Biotic

Bermuda spring dead spot

Uniform Stripes - Abiotic

Fertilizer application problems
– drop spreader

Steps in Problem Diagnosis

Examine Cultural Practices and Weather Conditions

- Ask questions - Collect as much background information as possible on cultural practices.
- When was the problem first noticed?
- Was the damage sudden or gradual? Get specific!
- Has the problem spread? How? How fast?
- How old are affected plants? How long planted? Aftercare?
- What cultural practices have been performed recently- especially just prior to noticing a problem. Herbicide sprays? Fertilizer used? Construction done? (how about these practices on neighbors property – need not be very recent)
- What has the weather been like (don't forget previous winter cold or summer drought events – especially on larger plants)

Tip: for young woody plants (1-5 years in the ground) many problems result from poor planting, poor location, plant timing and immediate aftercare.



What
problems do
you see?

At Least 3 Mistakes Clearly Evident:



- 1. Burlap still on trunk.
- 2. Soil is in very poor condition
- 3. Can't tell proper depth w/out a closer look at the rootball.

Reminder to self: Leyland
Cypress call



Symptom: Poor growth

Sign: Bark split

- Full sun exposure
- South side of tree
- Young tree



Diagnosis: likely sunscald (could be mechanical damage)

- Full sun exposure
- South side of tree
- Young tree



Remember: stressed trees are more pest prone
– example of abiotic problem leading to biotic pest
pest



Maple Scale

Bottom of Maple with Scale



Abiotic concerns

- Root girdling
- Freeze/thaw damage
- Small root area
- Heat island in parking lot
- Red maple – likes wet sites

Biotic problem of scale is secondary in nature

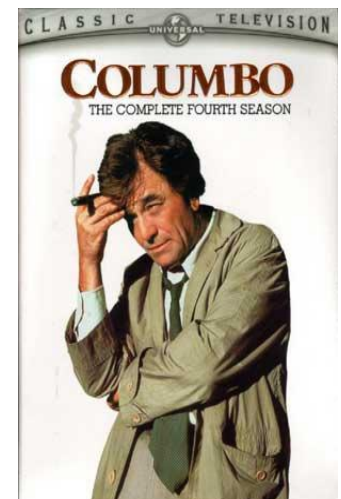
Leyland Cypress Problems



Another instance where an abiotic problem (drought) caused a biotic disease (canker) – Knowing the plant and it's common problems helps you reach a quicker diagnosis



Hosta:

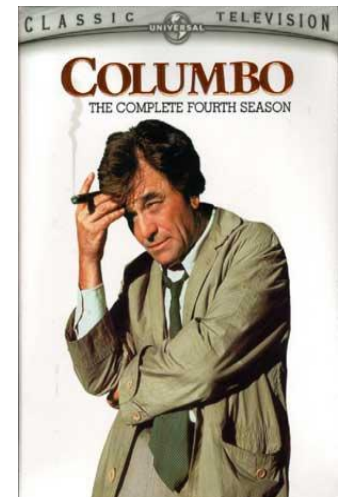


Clue: recent tree removal



Hosta: Sunburn

Clue: recent tree removal



Tips on Diagnosing Tree Problems



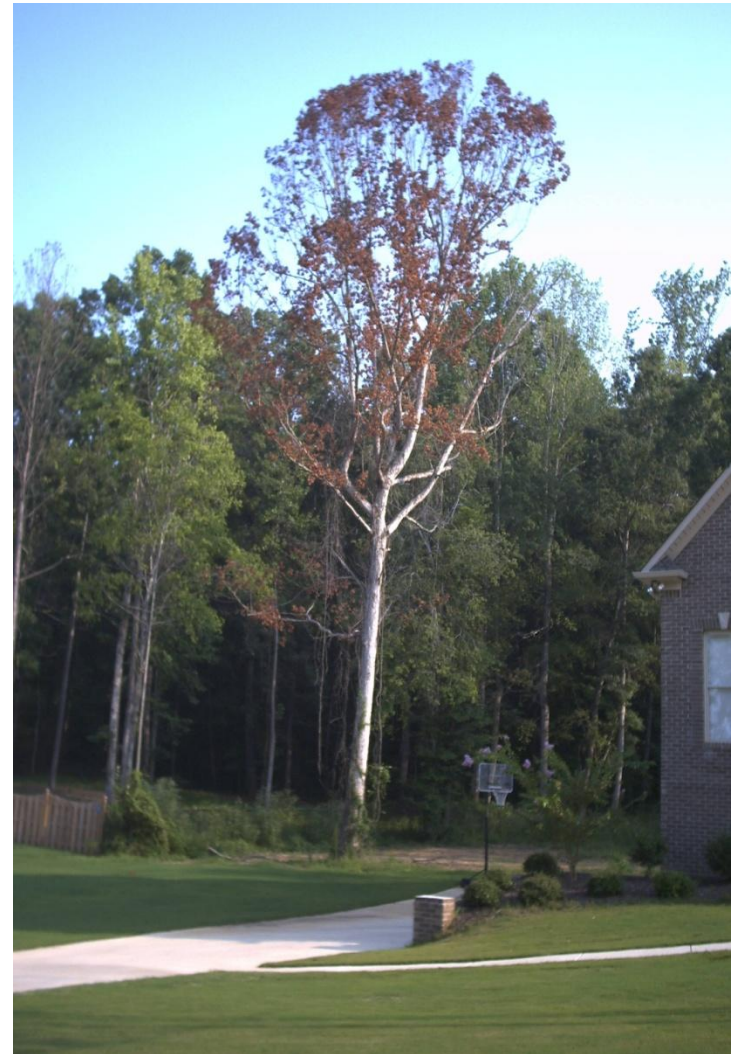
Needle Bearing Plants Die from the Inside Moving Outward

- The needles stay attached if death was rapid
- May happen anytime of the year depending on the cause
- Note appearance of similar trees in the area (isolated instance or widespread)



Broadleaf Deciduous Plants

- Rapid leaf death
- Leaves did not fall off the tree
- Started at the outside and moved inward (opposite of needle bearing plants)
- Cause of death here????



Construction Damage



Telephone pole appearance



No root flare –
first major root
was one foot
deep



Leaves held
on the tree

Dogwood



What clues do you see?

Dogwood



No mulch ring – grass/weeds near trunk

Dogwood



String trimmer or lawn mower
:abiotic disease



May lead to
biotic pest –
dogwood borers
or even a biotic
disease

Sign: Holes drilled or torn in wood



Burford holly



Any ideas?



Pecan

Sapsucker Damage



Damage may look very different from one plant to another – both are sapsucker damage



Burford holly

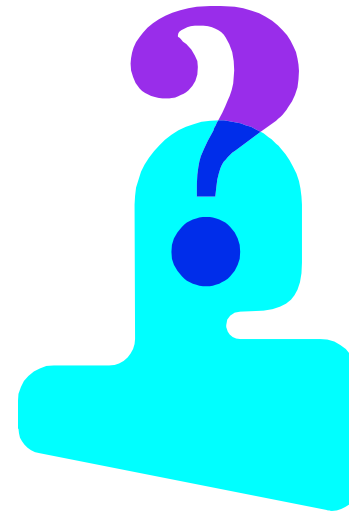


Pecan

Sample diagnosis: My gardenias look sick with few leaves and a lot of yellowing



What questions come to mind?



Sample diagnosis: My gardenias look sick with few leaves and a lot of yellowing



How long ago planted?

How are surrounding plants doing? (what are they?)

How soon after planting did it start going down?

What does soil look like?

More Questions?

- How was it planted ? Bark removed or left intact?
- What was the watering schedule? (do you check to see how wet the soil is before watering) (do you check the actual rootball wetness)
- Do you know the soil pH?
- Do you see any signs of scale/whiteflies or other pest?
- Is the yellowing on the old or newer leaves?
- Is the leaf uniformly yellow or are the veins still green?
- What are the light conditions?
- Do you have any other gardenias nearby that are healthy? Any differences in soil/light or care?
- Any recent chemicals applied to the area?
- What has the weather been like recently?
- **Now you have enough information to start researching!!!**

Where to look once info is collected?

- Extension pubs
- Reference books
- Plant society FAQ areas
- Fellow MGs
- Internet –use advanced search engine settings to limit useless hits
- Diagnostic aids on the internet (Maryland site is very good)



Search:

UNIVERSITY OF
MARYLAND
EXTENSION
Solutions in your community



Friday, August 6, 2010

Welcome to the University of Maryland, Home and Garden Information Center's Plant Diagnostic Web Site!



This site offers photographic keys to help diagnose and solve plant problems, using Integrated Pest Management principles.

Initial development of this site in 1998, was made possible by a grant from the Northeast Regional IPM Grants Program, U.S. Department of Agriculture (USDA).

Please give us feedback through the online Survey. We will continue to expand the site, so visit again soon!

For site directions and basic IPM information please choose from the list below:

[Site Directions](#)

[Instructions for Submitting Plant or Insect Samples](#)

[Developing Diagnostic and Decision Making Skills](#)

[Non-Chemical Control Strategies For Pests and Diseases](#)

[How to Decide When to Take Action Against a Pest, Disease, or Environmental Problem.](#)

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Tomato Problem Solver

A Guide to the Identification of Common Problems

Tomato Disorders

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- Stem
- Root



We gratefully acknowledge the cooperation of Allen Stevens and Jon Watterson, Seminis Vegetable Seeds, Inc. for allowing the reproduction of the images in the publication "Tomato Diseases-A Practical Guide for Seedsmen, Growers & Agricultural Advisors."

Images of the fruit, leaf, stem and root sections are property of Seminis, Inc.

Images in the insect section were provided courtesy of AVRDC - The World Vegetable Center.

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Developing New Camellias
Explore the possibilities of creating new camellias. You'll find information here ranging from hybridizing, seed production to registration of seedlings. [more +](#)
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Camellia Cultivars Registered by the ACS
Camellias Cultivars Registered by the American Camellia Society - 2000 through the present. [more +](#)
- 

Naming and Registering New Cultivars



Education

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- [Camellia Cultivars Registered by the ACS](#)
- [Naming and Registering New Cultivars](#)
- [Gardening With Camellias](#)

Horticulture on the Internet

NC STATE UNIVERSITY

Department of Horticultural Science

The amount of gardening information on the Internet can be overwhelming! I have grouped my bookmarks into the following categories for your reference.

Plant Groups	Garden Topics	Sources of Information
Ferns	Beneficial Insects	Associations, Societies
Flowering Bulbs	Biological Pest Control	Classes Online
Flowers	Birds	Public and Private Gardens
Flowers: Annual	Botany	Magazines, Books, Newsletters
Flowers: Perennial	Butterflies	On-Line Companies & Nurseries
Fruits and Nuts	Community Gardens	NC State University
Ground Covers	Compost & Mulch	North Carolina
Herbs	Environmental Issues	Searches
Houseplants	General Horticulture	Weather
Lawn Care	Insects	
Ornamental Grasses	Integrated Pest Management	
Poisonous Plants	Landscaping	
Roses	Master Gardener	Miscellaneous
Shrubs	Organic Gardening	Website backgrounds
Shrubs - Specific Plants	Pesticides	Web Graphics - Lines
Trees	Plant Diseases	Web Graphics - Symbols
Trees - Specific Plants	Plant Propagation	
Vegetables	Radio/TV gardening shows	Useful Links
Vines	Soils and Fertilizers	Volunteer Issues
Water Gardens	Water Conservation	Youth Hort
Weeds	Water Quality	
Wildflowers	Wildlife	

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**Author: LAURENCE
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