

The background is a solid green color with a faint, stylized pattern of overlapping leaves and stems in a slightly darker shade of green. The leaves are scattered across the frame, creating a natural, garden-like feel.

DIAGNOSING LANDSCAPE & GARDEN PROBLEMS

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UC FARM ADVISOR

April 7, 2011

HANDOUTS

- **Outline**
- **Plant Disease Diagnosis**
- **Diagnosing Problems Caused by Insects/Mites**
- **Techniques for Diagnosing Plant Problems**
- **Refer to Chapter 22, “Diagnosing Plant Problems”**

INTRODUCTION

- The Plan
 - Take you through exercises
 - Short lecture
 - “Hands-on” plant clinic
- Aimed at teaching you **HOW TO APPROACH A PLANT PROBLEM IN ORDER TO DIAGNOSE THE CAUSE**
- Focus on the **PROCESS of DIAGNOSIS & DEVELOPING OBSERVATION SKILLS**
- The Goal
 - You will have some idea what to do when you get your first call as a MG & are asked to diagnose a plant problem
 - You will look at plants a little differently & more carefully than you did before

THE DIAGNOSTIC PROCESS

- First Part of Lecture
 - Focus on “**Process of Diagnosis**”
- Second Part of Lecture
 - Focus on “**Symptom Recognition**”

This will tie together some of the previous lectures

First Call!

- **Client**
 - “My orange tree has bugs that are killing it”
- **Master Gardener – What are you going to do?**
 - A. Panic
 - B. Run into your Farm Advisor’s office
 - C. Ask the client questions
 - D. Tell the client you are sorry, but don’t know anything about bugs or orange trees

PLANT SAMPLE EXERCISE
(5 minutes – work in pairs)

IMAGINE IT'S YOUR FIRST DAY,
A client comes in with a sample
“what is wrong with my plant?”

- 1-Write down a description of the symptoms you see**
- 2-Write down any questions you need to ask to diagnose the problem**



DIAGNOSTIC SKILLS

- **HOW TO APPROACH THE PROBLEM TO DIAGNOSE THE CAUSE**

- When a plant is subjected to unfavorable growing conditions compared to plants growing under more normal conditions, certain **SYMPTOMS** become evident.
- This is what will prompt the homeowner to call you

WHAT IS WRONG WITH MY PLANTS ?
WHAT HAPPENED ?



The background is a solid green color with a pattern of overlapping, semi-transparent green leaves and stems, creating a natural, organic feel.

**HOW ARE YOU GOING TO HELP
THIS PERSON?**

**These are the skills we'll start to
develop today**

HOW TO APPROACH DIAGNOSIS

ASK YOURSELF

- **WHAT DO I NEED TO KNOW?**
- **WHAT EQUIPMENT DO I NEED?**
- **WHAT TYPE OF OBSERVATIONS SHOULD I MAKE?**
- **WHAT QUESTIONS DO I HAVE TO ASK?**
- **WHAT CAN I DEDUCE FROM DIFFERENT SYMPTOM TYPES?**

- YOU CAN OFTEN DISTINGUISH BETWEEN DIFFERENT PROBLEMS BY LEARNING TO RECOGNIZE DIFFERENT SYMPTOM TYPES



EQUIPMENT/TOOLS NEEDED

- POCKET KNIFE
- HAND LENS
- PLASTIC BAGS
- PROBLEM WORKSHEET or NOTEBOOK
- SHOVEL
- CAMERA
- DISSECTING SCOPE (OFFICE)

PROBLEM WORKSHEET

● MASTER GARDENER CALLER FORM DATE _____
TAKEN BY MG _____

CALLER NAME _____ PHONE _____
ADDRESS _____
PLANT & PROBLEM _____

SAMPLE SUBMITTED: YES NO (COMMENT) _____

PLANT AGE _____ PLANT SIZE _____ OTHER PLANTS AFFECTED _____
WATERING METHOD DRIP FLOOD SPRINKLE OTHER _____
How OFTEN? _____ How LONG? _____

SOIL TYPE: CLAY LOAM SANDY
EXPOSURE: FULL SUN PART SUN SHADE N, S, E, W AND REFLECTIVE (CIRCLE ONE)
CHEMICAL APPLICATIONS TO SOIL OR PLANTS: _____

● MG RESPONSE/COMMENTS: _____

CALL BACK DATE _____ BY _____ (COMMENT) _____
DATE _____ BY _____
DATE _____ BY _____

● COMPLETED DATE _____ By _____

- HELPFUL TO HAVE CLIENT FILL THIS OUT
- USE TO ASK QUESTIONS FROM & COLLECT PERTINENT INFORMATION
- WHO ASKED “WHAT KIND OF PLANT?” DURING EXERCISE?

Questions To Ask

- Very important to get background information to begin narrowing down the problem.
- **Remember the client at beginning of program “My orange tree has bugs that are killing it”**
 - Can you see the bugs? If so, what do they look like? Color, size, etc.
 - Are they on the twigs, leaves, etc.?
 - **What are the symptoms – holes or stippling on leaves, How many orange trees have these bugs?**
 - **branch dieback, etc.?**
 - Please bring a sample showing symptoms and bugs into the office for I.D. for a tentative diagnosis.

CLIENT – “MY TREE IS DYING”

MG – “WHAT KIND OF TREE?”

“WHERE IS THE TREE GROWING?”

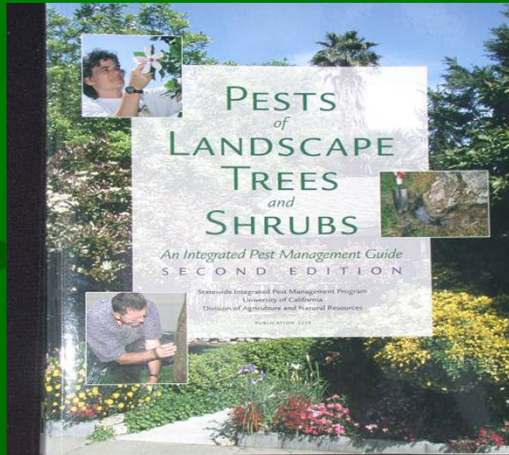
“WHAT ARE THE SYMPTOMS?”

“WHERE ON THE TREE DO YOU SEE
THE SYMPTOMS?”

WHAT DO I NEED TO KNOW

- THE DISEASES AND INSECTS REPORTED ON THE HOST PLANT
- THE DISEASES AND INSECTS MOST PREVALENT IN THIS AREA AND FACTORS AFFECTING THEIR DEVELOPMENT

REFERENCE BOOKS



WHAT THE PROBLEM LOOKS LIKE	PRIMARY CAUSE	
DOUGLAS-FIR (<i>Pseudotsuga menziesii</i>) <i>stemmed</i> Foliage missing 1 to 4 inches in diameter, progressing from twigs and limbs. Limbs occasionally break.	Douglas fir pitch moth. Tiny whitish larva, 5.1 inch long, in pitch.	See Pitch Moth, 131.
Cliffhanger gnomes 1 to 12 inches in diameter on main. Shores may die back.	Bacterial gall, possibly <i>Aphelococcus pseudotsugae</i> . Disease of crowded, crowded trees under wet conditions.	See similar Crown Gall, 258.
Needles pulled or swollen. Possible needle drop and twig dieback.	Needle and twig midges. <i>Contarinia</i> spp. What larvae in swollen needles. Tiny recognizable adults emerge from paper in soil.	Apparently do not harm landscape trees. Prune out damaged shoots. New shoots are especially valuable (nurseries) trees may be sprayed if well-timed when adults are laying eggs. See Gull Midges, 198.
Needles or terminals curled, distorted, or swollen. Shores may grow crookedly.	Douglas fir bud mite, <i>Tyoseius</i> sp. Tiny elongated elongated mites that suck bud tissue.	See Gull Mite, 203.
Needles are chewed. Buds on the basal twigs may be distorted or injured.	Cornifer twig weevil. Small black to brown weevils (larvae) and adults. Pale larvae here on the root crown of dying or injured twigs.	Except for white pine weevil, most are secondary pests of insect importance. See 93.
Needles chewed or notched. Branches may appear to die. Some areas stripped of bark at girdled near soil.	Black vine weevil. Adults are black or grayish brown beetles, about 1 inch long. Larvae are white grubs with brown head.	See 92.
Needles chewed. Foliage between. May be sick looking on needles.	Douglas fir tussock moth. <i>Diorys podocypus</i> . Silver-spined tiger moth. <i>Lophocampa argentata</i> (family Arctidae). Caterpillars hairy, brownish with orange, red, or yellow.	Vigorous trees tolerate moderate damage. Apply Bacillus thuringiensis to control young larvae, if needed. See Tussock Moth, 74, 77.
DRACAENA (<i>Calodera</i> , <i>Dracaena</i> spp.) Core plant, Dragon tree, Flame		
Leaves yellow and with. Entire plant may die. More subtle damage: growth may be stunted, branch bark or on soil.	<i>Armillaria</i> root rot. Favored by warm, wet soil. Prunes for years in infected roots.	See 262.
Leaves pale, yellow, brown, or with, often toward distal portion canopy or first out on soil of plant. Branches die. Entire plant may die.	Vesicular wilt. A soil-dwelling fungus that infects through roots.	See 212.
Leaves have sun to brown circular spots or blotches. Leaf spots die. Plants turn slightly yellow, wilt.	<i>Anthonomus</i> . <i>Glomerella</i> (spathe) Fungus germs in infected tissue. Spores spread by splashing water. Favored by wet conditions.	See 223.
Plants may stunt, decline, or (rarely) die. Heavily water material may be visible on roots and around crown.	Ground mounding. <i>Diorys</i> (spathe) Small, slender, pale insects that have powdery wax covering but no marginal filaments.	See 130.
Waxy honeydew and blackish sooty mold on plant. Foliage may yellow. Plants may grow slowly.	Mealybugs, including Longtailed mealybug. Forewings gray, insects with waxy marginal filaments.	See 120.
Waxy honeydew and blackish sooty mold on plant. Elongated, whitish material (egg) and/or stems or leaves.	Cortney cushion scale. Female brown, orange, and/or yellow with elongated, white, flared egg sacs when mature.	Natural enemies usually provide good control. See 142.
Leaves chewed.	Fallen nose beetle. Pale brown to black insect weevils, about 1 inch long.	Adults hide during day and feed at night. Larvae feed on roots. See 94.
Foliage distorted, stippled, or bleached. Twigs may die. Plants may have fine webbing.	Spider mites. Tiny greenish, reddish, or yellowish mites, only 2 dark spots.	See 197.

- A Must!
- What common diseases and insects are reported on host plant in your area?
- Know where to look for diseases or insects reported on plant
- Great problem solving tables

Abiotic Disorders of Landscape Plants

A Diagnostic Guide

Laurence R. Costello
Edward J. Perry
Nelda P. Matheny
J. Michael Henry
Pamela M. Geisel



University of California
Agriculture and Natural Resources
Publication 3420

50th
ANNIVERSARY

Westcott's Plant Disease Handbook

R. Kenneth Horst

SPIDER MITES

Integrated Pest Management in the Home Garden

Mites (Fig. 1) are common pests in landscapes and gardens and can be found feeding on many fruit trees, vines, berries, vegetables, and ornamental plants. Although related to insects, mites are not insects but members of the arachnid class along with spiders and ticks. The spider mites, also called web-spinning mites, are the most common mite pests and among the most ubiquitous of all pests in the garden and farm.

The web-spinning spider mites include Pacific spider mite, two-spotted spider mite, strawberry spider mite, and several other species. Most spider mites are closely related species in the *Tetranychus* genus and can be reliably distinguished in the field. However, there is little need to do so since their damage, biology, and management are virtually the same.

IDENTIFICATION
To the naked eye, spider mites look like tiny moving dots; however, you can see them easily with a 10X hand lens. Adult females, the largest forms, are less than 1/8 inch long. Spider mites live in colonies, mostly on the under-surfaces of leaves; a single colony may contain hundreds of individuals. The names "spider mite" and "web-spinning mite" come from the silk webbing most species produce on infested leaves. The presence of webbing is an easy way to distinguish them from all other types of mites.

Adults have eight legs and an oval body, with two red eyespots near the head end of the body. Females usually have a large, dark blotch on each side of the body and numerous bristles covering the legs and body. Immatures

resemble adults, except the newly hatched larvae have only six legs (Fig. 2). Eggs are spherical and translucent, like tiny droplets, becoming cream colored before hatching.

LIFE CYCLE
In some parts of California, spider mites may feed and reproduce all year on plants that retain their green leaves through the winter. In colder areas and on deciduous trees that drop their leaves, web-spinning mites overwinter as red or orange mated females under rough bark scales and in ground litter and trash. They begin feeding and laying eggs when warm weather returns in spring.

Spider mites reproduce rapidly in hot weather and commonly become numerous in June through September. If temperature and food supplies are favorable, a generation can be completed in less than a week. Spider mites are generally favored by hot, dusty conditions and are usually found first on trees or plants adjacent to dusty roadways or at margins of gardens. Plants under water stress are also highly susceptible. As foliage quality declines on heavily infested plants, female mites catch wind currents and disperse to other plants. High mite populations may undergo a rapid decline in late summer when predators overtake them, host plant conditions become unfavorable, the weather turns cooler, or following rain.

DAMAGE
Mites cause damage by sucking cell contents from leaves. A small number of mites is not usually reason for concern, but very high populations—levels high enough to show visible damage to



Figure 1. Spider mite.

leaves—can be damaging to plants, especially herbaceous ones. At first, the damage shows up as a stippling of light dots on the leaves; sometimes the leaves take on a bronze color. As feeding continues, the leaves turn yellow and drop off. Often leaves, twigs, and fruit are covered with large amounts of webbing. Damage is usually worse when compounded by water stress.

Loss of leaves will not cause yield losses in fruit trees during the year of infestation unless it occurs in spring or very early summer, but it may impact next year's crop. On annual vegetable crops, such as squash, melons, and watermelons, loss of leaves can have a significant impact on yield and lead to sunburning. On crops such as sugar peas and beans, where pods are attacked, spider mites can cause direct damage. On ornamentals, mites are primarily an aesthetic concern, but can kill plants if populations become very high on annual plants. Spider mites are

USEFUL WEBSITES

- **UC IPM WEBSITE**

- **MANAGING HOME GARDEN PESTS**

- <http://ipm.ucdavis.edu/PMG/menu.homegarden.html>

- **UC DAVIS FRUIT AND NUT CENTER**

- **THE BACKYARD ORCHARD**

- <http://fruitsandnuts.ucdavis.edu>

- **ANR CATALOG**

- **PEST NOTES, 8000 SERIES**

- <http://anrcatalog.ucdavis.edu/>

CONFIRM or ELIMINATE

- THE MOST OBVIOUS POSSIBLE CAUSES
 - Takes Experience!
- Decide if it's Insect, Disease, Abiotic, Man Caused - Chemical

Are Symptoms...?

GENERALIZED

VS.

LOCALIZED

What Plant Parts Are Affected?

- Most insects and diseases affect only certain parts of the plant.
- This will help in diagnosing
- Often will get samples of only above ground symptoms, but problem will be in roots.
- The diagnostician must **FIND THE SITE OF PRIMARY INJURY**. This is the challenge!
- Client must bring in large enough & representative samples.

The background is a solid green color with a pattern of overlapping, semi-transparent leaf shapes in various shades of green, creating a textured, naturalistic effect.

- **SOME ADVICE...**

- **Often will be asked to determine the cause by a description given over the phone**

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- **BE CAUTIOUS**

- When providing advice, unless you have a representative sample in front of you.

HANDLING SAMPLES

- Handle carefully!
 - Don't shake them
 - Don't destroy the symptoms or signs
 - E.g. – don't rub off the fungal spores of powdery mildew
 - Cut into the boundary margin between healthy and affected tissue to look for canker margins
 - Keep fresh in plastic bags in the refrigerator for later inspection

QUESTIONS to ASK CLIENT and YOURSELF

- What kind of plant has the problem?
- What are the diseases, insects and abiotic problems reported on the plant?
- What are the common insects and diseases in the area?
- What is the distribution of problem in yard?
- What was the weather before symptoms appeared or were seen?
- What plant parts are affected?
- What is the site of the primary injury?
- What are the **symptoms**?



SYMPTOMS ARE A GUIDE TO THE CAUSE

**To help us diagnose the cause,
We need to develop skills in recognizing
symptoms**

Recognizing Symptoms

Audience Participation Exercise

- We are going to get you looking at plants and symptoms more carefully.
- Go around the room and describe the symptoms you see.
- Do not identify the plant or try to diagnose the cause.
- Look at the slide and describe what you see.
- The rest, listen carefully, these are the kinds of descriptions you will hear on the phone

THESE ARE SYMPTOMS

- We have been looking at symptoms
- These are **A GUIDE TO THE CAUSE**
 - Before giving a recommendation to manage or control a yard problem
 - **WE MUST DIAGNOSE PROBLEM CORRECTLY**
- We must **FIND THE CAUSE** to why the plant is responding with these symptoms.
 - (We will return to these slides after we discuss causes)

NEXT PART OF LECTURE

- Review main causes of landscape plant problems
- Define **SYMPTOM TYPES** you are likely to find in the field
- **The Purpose Today Is To Start Associating Certain Symptoms With Certain Causes**
- (not going into detail nor discussing control)

CAUSES of PLANT DISEASE

■ PARASITIC

- Fungi
- Bacteria
- Viruses
- Phytoplasma
- Nematodes
- Parasitic Plants
- (Insects & Mites too!)

■ NON-PARASITIC

- Soil moisture or temperature extremes
- Air temperature extremes
- Mineral extremes
- Air pollution
- Wind, light effects
- Soil structure
- Mechanical damage
- Pesticide damage

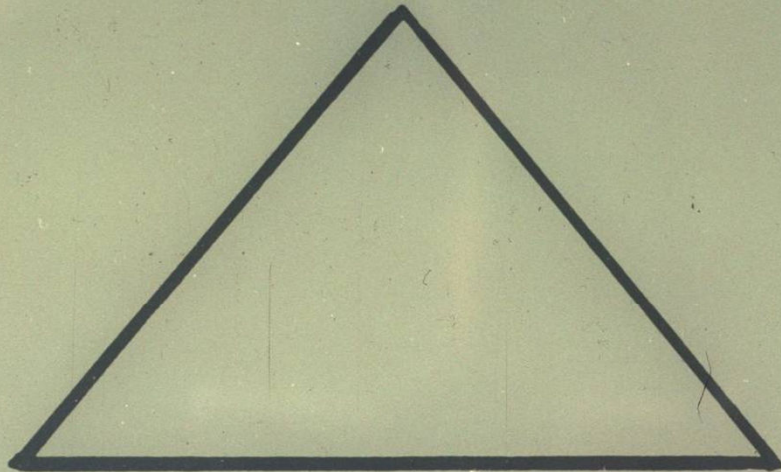
Non-parasitic (Abiotic) Plant Diseases

- Caused by adverse environmental conditions
- Often the result of human activity
- Abiotic disorders can predispose plants to attack by insects and pathogens
- **EXCESS OR LACK OF SOMETHING THAT SUPPORTS LIFE**



**PARASITIC or INFECTIOUS
PLANT DISEASES**

PLANT



ENVIRONMENT

PATHOGEN

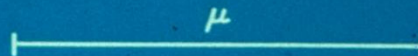
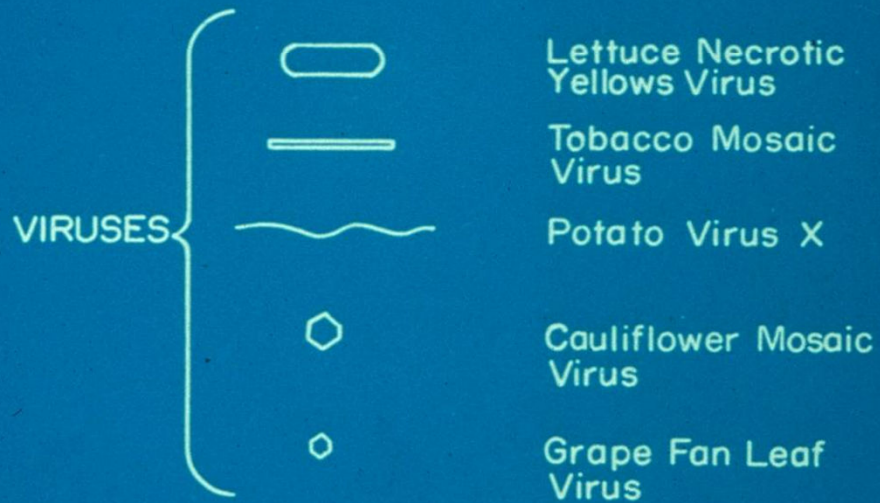
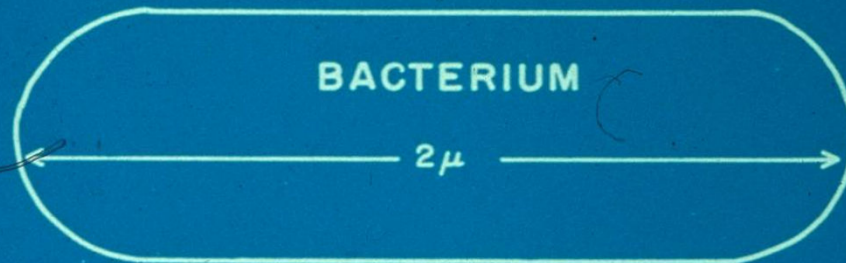


VIRUS DISEASES

VIRUS DISEASES

- VIRUSES and VIROIDS are the SMALLEST KNOWN ORGANISMS
 - Capable of being transmitted from plant to plant
 - Can only be observed with an electron microscope
 - Detected using PCR's
 - Structurally simple
 - Rely on their host plant's living cells to replicate

SIZE AND SHAPE OF VIRUSES



The background of the slide is a dark green color with a pattern of lighter green, stylized leaves and stems. The leaves are arranged in a way that they appear to be growing from a central point, with some leaves pointing upwards and others downwards. The overall effect is a dense, naturalistic pattern.

SYMPTOMS

GROWTH REDUCTIONS



The background of the slide is a dark green color with a pattern of lighter green, stylized leaf shapes. The leaves are arranged in a way that they appear to be overlapping and filling the space. The overall effect is a dense, naturalistic texture.

SYMPTOMS

COLOR CHANGES











SYMPTOMS

MALFORMATIONS



The background of the slide is a dark green color with a pattern of lighter green, semi-transparent leaves and stems, creating a natural, botanical feel.

SYMPTOM

NECROSIS (DEATH)





**PLANT DISEASES
CAUSED BY
BACTERIA**

MOST COMMON SYMPTOMS

- **GALLS**
- **LEAF SPOTS**
- **SYSTEMIC SYMPTOMS**

The background of the slide is a dark green color with a pattern of lighter green, stylized leaf outlines. The leaves are arranged in a way that they appear to be growing from the bottom and spreading outwards.

SYMPTOM

GALLS

SWELLING or OVERGROWTH







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SYMPTOM

LEAF SPOTS

**Usually Angular with
Water Soaked Lesions**





SYMPTOM

SYSTEMIC





FIREBLIGHT



Plant Diseases Caused by Fungi



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