



# Training Guide:

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# Plant Pathology

## SETTING UP

### Materials needed:

- This Training Guide
- Several copies of *Insects & Diseases of Woody Plants of Colorado*
- Hand lenses
- GN #333 Worksheet (in this guide)
- Plant samples or photos (or alternative samples) as described in GN333:
  - Lilac leaves
  - Currant or Hawthorne leaves
  - Canada Red Cherry twigs PLUS photos of whole tree
  - Aspen or Linden leaves
- GN #332 Homework (optional for students and counties)

ACTIVITY:

## PLANT PATHOLOGY LAB / IN-CLASS ACTIVITY

Time: 40 minutes over the course of the presentation

>> **Connect with instructor before class to determine coordination of activities**

1. Handout worksheets & books: GardenNotes #333 and *Insects & Disease of Woody Plants of Colorado*
2. Handout or set-up stations for each activity that include PLANT SAMPLES.
3. Have students team up in small groups or work independently.
4. Give students time to discuss and answer questions at each station/with all samples.
5. Bring class back together to review answers. Offer suggestions/clarifications based on the answers in this guide.

*CMG GardenNotes #333*

### Worksheet: Plant Pathology

Instructors/coordinators: Please note that answers may vary if samples change.

#### **Activity 1: Symptoms vs. Signs**

**Lilac Leaves (if available in your county)**

Mrs. Johnson hires ABC Landscape Company to take care of her lawn. They mow and spray for weeds. On a recent visit in August, ABC applied a weed killer to the lawn. A week later, Ms. Johnson notices the leaves on her on her lilac or \_\_\_\_\_ are turning white. She is certain that the weed killer ABC sprayed on the lawn must have caused this damage because the problem appeared so soon after the treatment.

She brings in a sample of the leaves for you to look at to verify her assumption. Given the information we have covered so far in class:

**A. What will you look for first?** Describe them.

*(Hint: chlorosis, necrosis, wilting and stunting are examples)*

Symptoms: white or gray strands or fluff; leaf color may be grayish; leaves may have white patches on them.

**B. What will you look for next?** Describe them if found.

*(Hint: spores and fruiting structures are examples)*

Signs: mycelium (the strands described above); also small black or tan colored bead-like structures (cleistothecia – fruiting structures)

## **Activity 2: Symptoms vs. Signs**

**Currant or Hawthorn leaves (if available in your county)**

Mrs. Johnson has another sample to show you. She is still certain that ABC Landscape must have damaged plants in her landscape. Now she shows you some \_\_\_\_\_ (currant, hawthorn or other) leaves.

The leaves developed these spots about the same time the lilac problem appeared.

Given the information we have covered so far in class:

**A. What will you look for first?** Symptoms

*(Hint: chlorosis, necrosis, wilting and stunting are examples)*

**B. What will you look for next?** Signs

*(Hint: spores and fruiting structures are examples)*

**C. Describe the symptoms:**

The **currant's** symptoms are circular, brown spots or lesions on the leaves. Depending on sample, centers may be lighter brown.

The **hawthorn's** symptoms may be described as yellow, red, orange or brown leaf spots, or some combination of the colors.

**If you used different samples**, note the symptoms:

**D. Are there signs present?** Describe them if you find them.

**Currant** signs are present and are the black bead-like fruiting structures embedded in the center of the necrotic spots.

**Hawthorn** signs are present and may appear as sea urchin like structures, hairs or tubes on the leaf undersides.

**If you used different samples**, note the signs:

### **Activity 3: Identifying Plant Disease**

**Note: Use a twig sample available in your county and/or photos**

Carrie purchased a home this summer. As leaves began to drop in the fall, she noticed the strange growths on a **Canada red cherry [or insert other sample]** \_\_\_\_\_. They are scattered throughout the tree (see picture). She cut off a small branch and brought you the sample.

#### **1. Describe the symptoms.**

Rough, brown or black growths on branches.

#### **2. Describe signs if you see them.**

Actually the “knots” (brown/black rough growths) are a sign as well as a symptom. They are called stroma. When the fungus infects the plant tissue, fungal hormones stimulate the production of callus tissue, which the fungi then colonize. The fruiting structures are embedded within the stroma and spores are released under moist to wet spring conditions.

#### **3. What is your diagnosis?**

Black knot of cherry, chokecherry and plum

#### 4. How can she manage the problem?

Prune out affected branches at least 10 cm (4 inches) beyond gall.

Remove branches from site.

### Activity 4: Abiotic vs. Biotic

Aspen or Linden leaves (if available in your county) **Note: Use the provided sample or photos.**

The next client is Mr. Roberts. He has an **aspen/linden [or other]** tree. All of a sudden many of its leaves began turning brown and dropping off. He wants to know if this problem is caused by a disease or something else. He is in a hurry, so he leaves the sample with you.

**A. What do you notice about the *distribution* of the necrosis on the Roberts tree?**

The damage is confined to the outer edges of the leaves. All the samples show the same similar damage.

**B. How does the distribution of the necrosis on Mr. Roberts' tree compare with the distribution of the damage on Mrs. Johnson's plant?**

The distribution of the necrosis on the Roberts sample is uniform, along the leaf edges, while the damage on the Johnson sample is random, with the spots scattered.

### Activity 5: Abiotic vs. Biotic

Given the information we have covered so far in class and your examination of the leaf samples:

Determine if the damage on the samples is abiotic or biotic and state *why*.

**Plant**

**Abiotic or Biotic?**

Johnson: Lilac/Other

Biotic, found signs: fruiting structures, mycelium and random damage

Johnson: Currant/Hawthorn/Other Biotic, found signs: fruiting structures, random damage

Roberts: Linden/Aspen/Other Abiotic, no signs found, uniform damage

>> REVIEW HOMEWORK – AT NEXT CLASS IF YOU CHOOSE

GardenNotes #332 Time: 15 minutes

## Homework: Plant Pathology

1. What 4 components must be present for biotic disease to develop?  
(1) Susceptible plant; (2) organism that causes the disease; (3) correct environment and (4) correct time.
2. Another name for the living cause of disease biotic
3. Another name for the non-living cause of disease abiotic
4. List 3 ways to manage powdery mildew on a shrub.  
Possible answers include:
  - Thin/prune properly for good air circulation.
  - Site where there is good air movement.
  - Collect leaves in the fall and dispose.
  - Use appropriate fungicides at the appropriate time.
5. A customer brings you a foot-long branch of an aspen tree. The leaves on the branch tips are dark brown and wilted; the branch tip is bent over. Could this be fire blight? Why or why not?  
This cannot be fireblight, as the plant is an aspen which is not a pome fruit of the rose family.
6. List 2 general management strategies for Cytospora canker disease on an aspen.
  1. Prune out the affected tissue.
  2. Choose resistant varieties and grow a healthy plant.
7. How are leaf scorch and winter desiccation similar in terms of how they develop? In symptom expression?  
Both are caused by loss of water through the leaves and/or lack of available water. Both appear as necrotic damage; non deciduous plants leaves turn brown from the outside inward and on conifers needles turn brown from the tip inward.

8. A ten-foot row of low growing junipers is planted between the west facing side of a apartment building and a sidewalk. By mid-winter the sidewalk side of the junipers begins to turn completely brown. What symptom supports an abiotic diagnosis? State a possible cause of the juniper symptoms.

The biggest clue is that the entire sidewalk side of the junipers is brown (uniform appearance). The most likely cause of damage is salt injury from de-icer used on the sidewalk.