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# Submitting Plant Specimens for Disease Diagnosis

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## Submitting Plant Specimens for Disease Diagnosis

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Accurate diagnosis of a plant disease depends on having a fresh sample representative of the problem. To get an accurate diagnosis when your plant has a disease problem, you need to collect the right kind of sample.

You also need to provide complete information about the plant and its history. Since the county Extension agent and the person making a diagnosis probably won't see the problem first hand at the growing site, you need to help them create a mental picture of the disease situation. You can provide this help by filling out the information requested on various Plant Disease Diagnostic Lab forms, along with the sample. Complete information and a representative sample are keys to an accurate diagnosis.

Before you collect the sample, please find the part of this publication relating to your plant's problem and read it carefully. Doing so can save you a lot of wasted time and effort and will help you get an accurate diagnosis.

### Seedlings

Seedlings are very difficult to collect and package because they are small, tender and easily attacked by secondary organisms. Without extra care these specimens deteriorate rapidly, making an accurate diagnosis impossible. If possible, divide the sample and package it by at least two different methods.

#### [Packaging seedlings.](#)

Provide at least a dozen seedlings in about a pint of soil. Dig them up carefully. Select seedlings showing all stages of the problem, but primarily those in early to mid-stages of disease development. Package them in a plastic bag. Make sure the soil is moist enough to support the plants, but never add a wet paper towel or over-water. Too much moisture encourages decay.

An alternative method is to compress soil around roots of each sample so that soil stays in contact with the roots. Package in a plastic bag. Always enclose a few plants free of soil in a separate plastic bag so that some plants will arrive clean. Gently wash soil off the roots with water before packaging.

That's all the special directions about seedlings. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

### Field, Row, or Garden Crops

Choose several plants showing a range of symptoms, especially those in early to mid-stages of the problem. Dig (never pull) plants to include the root system and surrounding soil.

Put the root ball into a leak-proof plastic bag. Soil should be somewhat moist so the plant stays alive. Tie off the plastic bag snugly around the stem. Securing soil in this manner helps avoid a messy sample as well as foliage decay from soil-borne organisms.

Tops of very large plants may have to be cut or bent into suitable lengths if the sample is shipped. Put the cut lengths into a plastic bag separate from the root ball.

That's all the special directions about annual crops. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

#### [Packaging the root ball and foliage.](#)

## Container-Grown Plants

Sending the whole plant is best. Select several complete plants showing early to mid-stages of the problem. You can leave plants in the pot or remove them from it. Either way, be sure the root/soil ball is placed in a plastic bag. Make sure soil is moist enough to support the plants, but never add a wet paper towel. Too much moisture encourages decay. Tie off the bag at the stem or trunk.

If you can't send the whole plant, submit at least 1 tablespoon of roots with a cup of soil in a plastic bag. In a separate bag, put as large a branch or stem as possible with leaves showing early to mid-stages of the problem.

That's all the special directions about container-grown plants. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

## Woody Plants

Choose some representative branches in early to mid-stages of the problem. Dead branches alone are seldom useful for diagnosis.

Cut off branches that have healthy twigs and affected portions on the same branch. Be sure to collect well below any branch cankers or dead portions that may be present. The sample should be as large as possible, a minimum of 1 ft long, but larger if possible. A small twig or just a few leaves rarely provides meaningful information for disease diagnosis.

Put the entire sample in a plastic bag and tie it off. Large specimens can be cut into smaller sections, if necessary, for shipping.

Include root samples dug from the dripline of the tree or shrub. A larger root (1/8 to 1/4" in diameter) with many thread-like feeder roots attached is best. Submit several roots whenever possible. Be sure that the roots sampled are from the affected plant and not from another plant nearby.

Put roots, along with any soil dug up, in a separate leak-proof plastic bag. Make sure the soil is moist. Tie off the bag with string or a twist-tie. When collecting samples from a canker or decayed area of a tree trunk, cut pieces of bark and wood from the margin of the diseased/live area. Place several of these wood samples (each about 1/2 to 1" size) in a plastic bag and tie it off.

[Collecting samples from woody plants.](#)

[Cutting samples from the margin.](#)

That's all the special directions about woody plants. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

## Vascular Wilts of Woody Ornamentals

### Dutch Elm Disease and Verticillium Wilt

Remove recently wilted branches from the tree or shrub, but do not use dead and dried-up branches. The branches you cut off should be 8 to 10" long.

Twigs should be at least 1/2 to 3/4" in diameter. For Verticillium Wilt of certain hosts (e.g. maple), you may need to collect larger samples from major limbs, the trunk or buttress roots. When collecting samples from a decayed area, cut pieces of bark and wood from the margin of the diseased/live area.

Infected limbs show vascular discoloration under the bark. Isolation of the causal fungus is easiest from twigs showing sporadic streaking, but can still be accomplished when twigs show a solid ring of discoloration.

Put specimens in a clean plastic bag, tie it off and refrigerate it until you can take it to your county Extension office.

That's all the special directions about these diseases. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

#### [Dutch Elm disease and Verticillium Wilt.](#)

### **Oak Wilt**

Cut an 8 to 10" long branch with wilting leaves. The inner bark should still be fresh and green. Dead and/or dried-up branches are not suitable.

Vascular discoloration may be evident on trees in the white oak group but is not common in the red oak group.

#### [Oak Wilt.](#)

Typical leaf symptoms of oaks in the red oak group are brown, scorched leaf tips. These symptoms should be evident on the red oak samples collected.

The twig should be about 1" in diameter. Collect samples as early in the growing season as possible. It is very difficult to isolate oak wilt fungus from samples collected during extremely hot weather. Put specimens in a clean plastic bag and refrigerate them until you can take them to your county Extension office.

That's all the special directions about oak wilt. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

### **Turf, Pasture Grasses and Small Grains**

Dig up 2 or 3 areas of sod (plants plus soil and roots) representative of the problem. Take the sample from the margin of the diseased area so that both healthy and diseased plants are included.

The sample should be 4 to 6" in diameter. Dig deep enough to include the root system (about 3 to 4" deep).

Put the sample in a clean leak-proof plastic bag and tie it off. Be sure the leaf blades are free of moisture and soil before closing the bag. If multiple samples are submitted, do not stack one sod piece on another in the same bag. Package each sample in a separate plastic bag.

If plants are more than 6" tall (e.g. small grains and many pasture grasses), dig up a clump of plants. Place roots and soil ball in a plastic bag and tie it off so the foliage remains soil-free. Make sure the soil is moist.

That's all the special directions about grasses. Now please go to the sections "What to do with Your Sample" and "Background Information Needed."

#### [Turf, pasture grasses and small grains.](#)

### **Mushrooms and Decaying Fruits, Vegetables and Tubers**

Rotting fruits, vegetables and tubers are the most difficult types of specimens to handle and they often arrive in poor condition in spite of one's best efforts. Mushrooms submitted for identification are also difficult to handle because of their high water content. Following these guidelines will help.

Select fruits and vegetables in the earliest stages of decay.

Dig up mushrooms so you can include any characteristic below-ground structures.

Dry the sample so that it is free of surface moisture. Wrap the specimens individually in several layers of newspaper. Ship samples you mail in a sturdy cardboard box.

Using air-tight containers (e.g. plastic bags) or adding moisture encourages more rapid decay; thus, avoid using them.

That's all the special directions about mushrooms and rotting specimens. Now please go to the sections "What to do

with Your Sample" and "Background Information Needed."

## What To Do With Your Sample

Take your fresh, representative sample immediately to your county Extension office. Do not expose the sample to extremes in heat or cold. It is very important that plant material arrive at the county Extension office as soon after collecting as possible.

Try to collect your sample early in the week, whenever you can. Sometimes the county agent can diagnose the problem. However, if the agent needs to mail your sample away for diagnosis, sending it on Monday through Wednesday is best. Samples mailed late in the week may spend a weekend somewhere enroute, and arrive in poor condition.

Do not mail your sample directly to the Plant Disease Diagnostic Lab.

## Background Information Needed

Once you arrive at the county Extension office with your sample, the staff will ask you to complete a Plant Disease Identification Form. This form, when properly filled out, provides the person making the diagnosis with vital information. Please fill in all questions on the form. Complete a separate form for each plant problem submitted; do not list more than one plant type per form. If you have pictures of the plant or field, these can be quite helpful.

In addition to the standard form, you need to complete a supplemental Tree and Shrub Disease Identification Form for all tree (ornamental and fruit) and shrub problems.

Before you bring your sample to the county Extension office, use the following questions to collect facts about a suspected disease situation, so you will be ready to complete the necessary forms.

### General

1. What kind of plant is it? If you know the variety, cultivar or hybrid, please include it.
2. What is its age? Be as specific as possible with herbaceous annuals and perennials. A general time frame (e.g. month and year) is often sufficient for woody ornamentals. Has the plant been recently transplanted or is it well established?
3. How was the crop produced (tillage, irrigation practices, fertilizer and other cultural practices)?
4. What is the weather history (drought, flooding, hail, lightning, frost, etc.)?
5. How is the problem distributed in the field, garden, greenhouse bench, etc. (single plant, scattered plants, group[s] of plants, large area[s], or entire planting)? What percentage of the crop is damaged?
6. Do you see any association of the problem with specific microenvironment conditions (low wet areas, high dry, different soil type, etc.)? With spray or fertilization patterns?
7. What chemicals have been applied to this crop (what, when and at what rate)? On a nearby crop? On the previous crop in this field?
8. What crop(s) was (were) previously grown in this site, especially over the past 3 to 5 years?
9. Is more than one cultivar or variety affected? Are you growing only one or several? Are plants of a different species (type) also showing these same symptoms?

### Trees and Shrubs

1. Are there any trunk injuries or cankers on the trunk or major branches? Look for splits, blistering of bark, sunken areas, changes in bark coloration, loose or soft bark (when pressed).
2. Is there a girdling root (especially a problem of maples)? Look for a large root forming a "noose" around the trunk within 12" of the soil surface. Mature trees (15 yrs or more) that are girdled lack a normal flare of buttress roots and the trunk will appear to go straight into the ground, like a telephone pole.
3. Are there any conks, mushrooms or other fungal fruiting bodies associated with the tree trunk or roots?
4. Have any root disturbances (e.g. construction, new sewer lines, etc.) occurred?
5. Does the turf or groundcover under the tree seem healthy?
6. Have any herbicides or soil sterilants been used nearby to control weeds or grass under the tree, along fences or

in sidewalk cracks?

### **Mushrooms**

Where was the sample collected (old log, lawn, field, woods, etc.)?

### **Turfgrass**

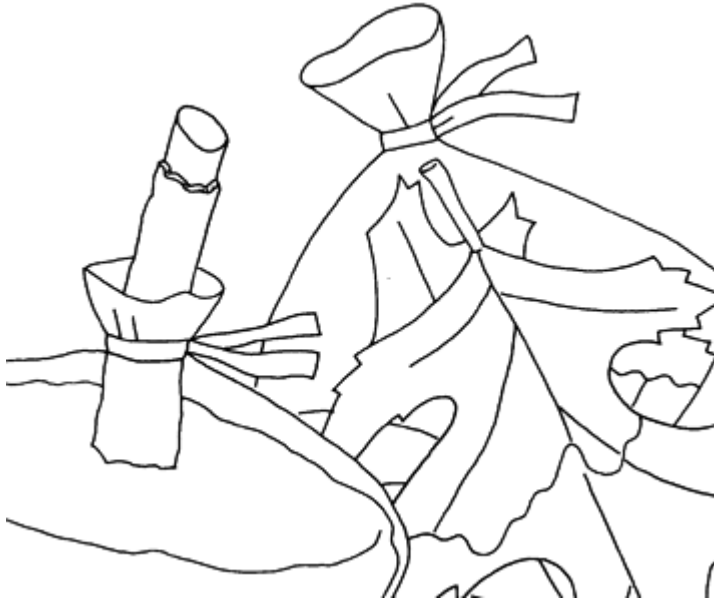
1. How large are the affected areas?
2. Do you notice any particular pattern (strips, circular, frog-eye pattern, etc.)?
3. Has the turf been irrigated? How much? How often?

### **Collection and Preparation Tips Summary**

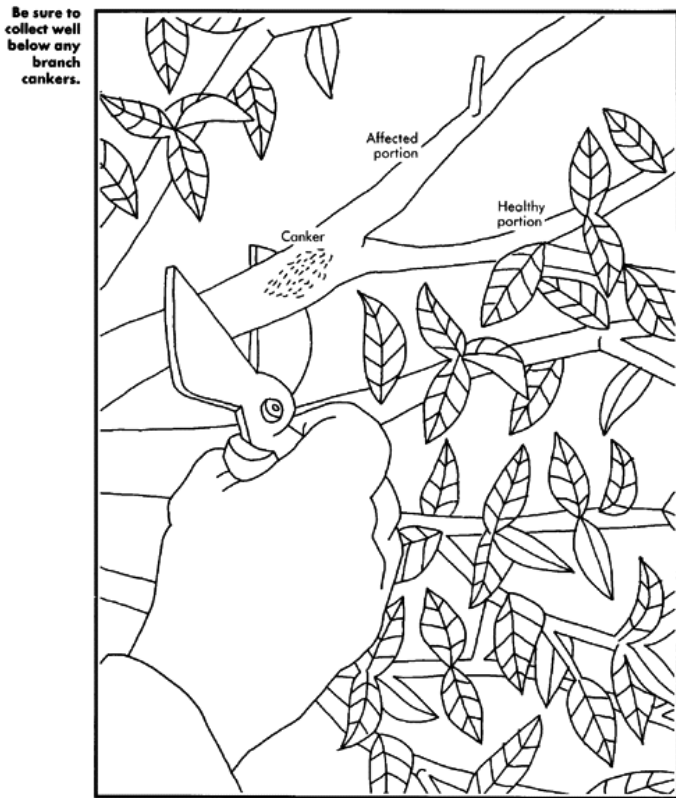
1. Examine the entire plant(s) and growing site very carefully.
2. Collect several representative samples that are still alive and show various stages of disease development.  
Provide a generous sample of plants in the disease's early to mid stages.
3. Collect the entire plant. When that is not possible, include some roots.
4. Use plastic bags. As soon as you collect them, enclose all specimens in plastic bags to keep them from drying out.  
Exceptions: decaying fruits, vegetables or tubers and mushrooms.
5. Tie off the root ball. Put roots and accompanying soil in a plastic bag and tie it securely to the plant's lower stem.
6. Do not mix different specimens in a single bag.
7. Do not add water or wet paper towels. You can add some moisture to the soil around the root ball. However, moisture added to leaves, stems and bare roots hastens decay by saprophytic organisms and obscures the real problem.
8. While it is fresh, submit the sample to your county Extension office.
9. Submit your sample early in the week.
10. Fill in the appropriate Plant Disease Diagnostic forms completely.
11. Cooperative Extension personnel should mail samples **FIRST CLASS**.



Packaging seedlings



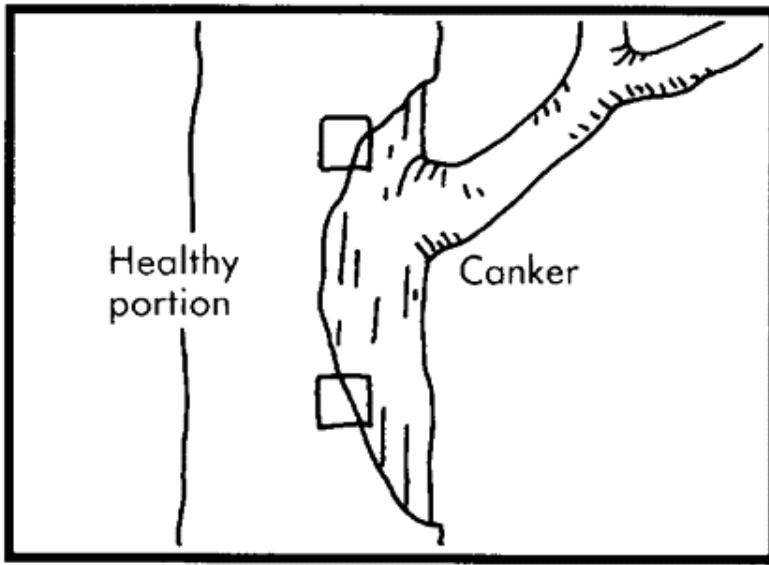
Packaging the root ball and foliage



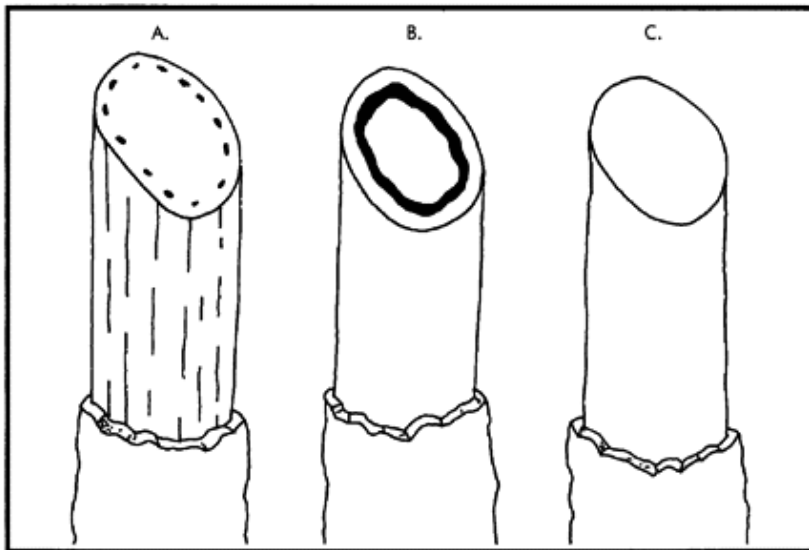
Be sure to collect well below any branch cankers.

Collecting samples from woody plants

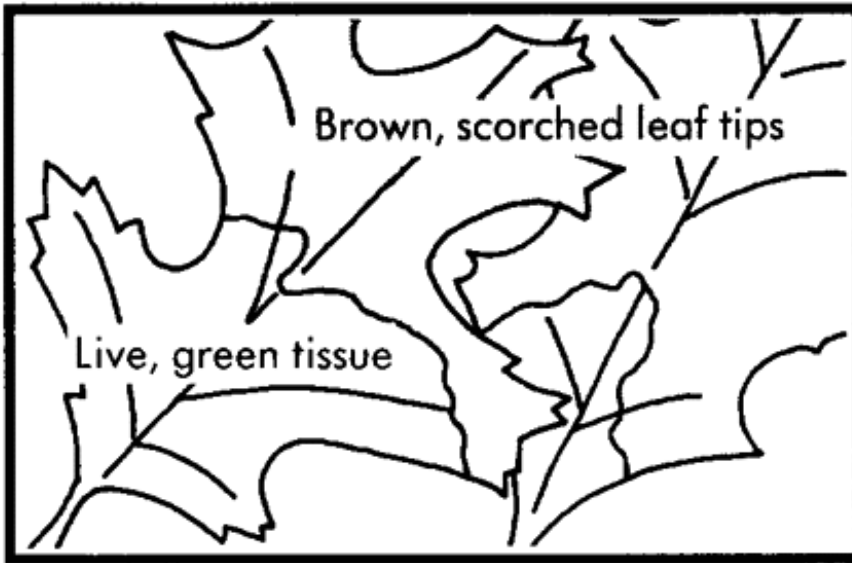




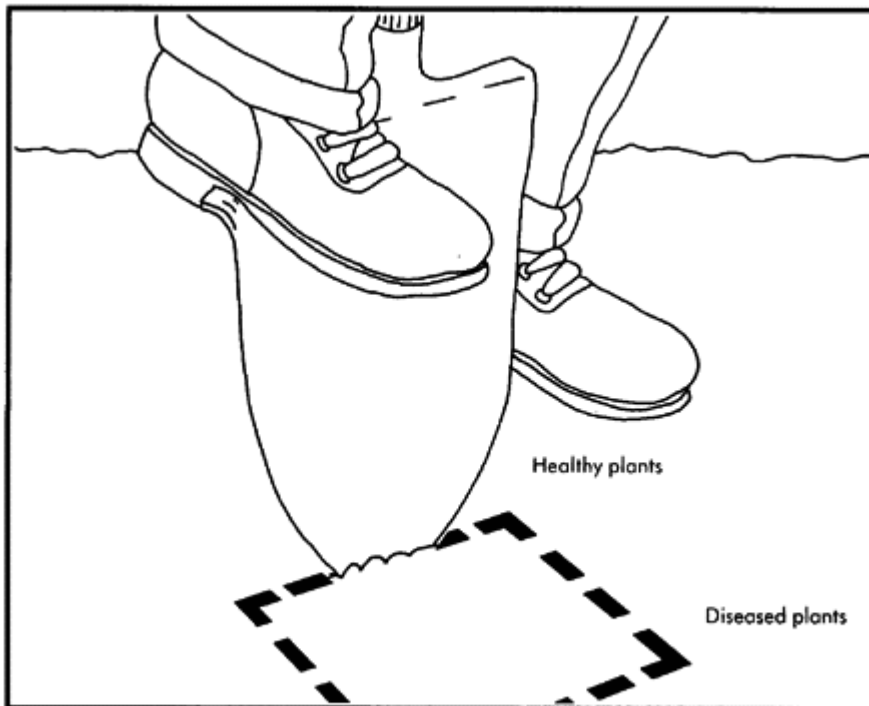
**Cut samples from the margin.**



Cutting samples from the margin



Dutch Elm disease and Verticillium Wilt



**Take your sample from the margin of the diseased area.**

Turf, pasture grasses and small grains