

Submitting Plant Specimens for Disease Diagnosis

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Diagnosis of plant diseases is one of the many ways that the University of Kentucky Plant Disease Diagnostic Laboratory and UK Cooperative Extension serve the citizens of Kentucky. This publication is designed to help growers collect and submit the best plant samples for an accurate diagnosis.

GATHERING INFORMATION

Information about the plant, planting site and symptoms can be as important as the physical plant material collected.

Key questions to ask include:

- *What kind of plant is it?* Indicate the variety, cultivar or whether the plant is a hybrid. If plant's identity is unknown, sending a healthy plant (or picture of a healthy plant) for comparison may be helpful.
- *What is the age of the plant or the planting date?* Be as specific as possible with annual crops. A general time frame (e.g., month and year) is often sufficient for trees and shrubs, but do indicate whether the plant has been recently transplanted or is well-established.
- *What has been done to care for the crop/plant?* Include information on tillage,



irrigation, fertilizer and pesticides, mulches and other cultural practices.

- *What is the weather history (e.g., drought, flood, hail, lightning, frost)?* Also note any site disturbances, such as nearby construction, utility work, etc.
- *What are the symptoms?* Describe the problem. Take time to examine the entire plant and determine the specific location of symptoms on the plant. Note anything unusual that may not be visible on the physical sample. For example, check tree trunks for wounds or for mechanical injuries. Are there any mushrooms or other fungal fruiting bodies associated with tree trunk or surface roots?

- *When did symptoms first appear?* Did they appear suddenly or progress (worsen) gradually?
- *Where are the affected plants?* Indicate the type of production system (e.g., field, greenhouse, landscape, etc.). Also note the terrain involved, such as whether the problem is in a low wet area, on a dry slope, etc.
- *How much of the crop/plant is affected?* Is a single plant showing symptoms, or are scattered plants, group(s) of plants or the entire planting affected? Are plants of different types showing the same symptoms? Look for any patterns.

COLLECTING A SAMPLE

A fresh, representative sample is critical for diagnosis.

Follow these general guidelines:

- Collect *whole plant samples* when possible, including roots.
- Always *dig plants* to keep root systems intact and soil in place around the roots. Small roots are often needed for diagnosis and they may be left behind if plants are pulled rather than dug.
- If only part of a plant is collected, such as detached leaves or branches, *describe the symptoms and location* of affected parts clearly (e.g., young vs. older leaves, one side of plant, etc.).
- *Choose several plants* showing a range of symptoms, especially those in the early stages of the problem. Diagnosis may not be possible if plants are completely dead.
- *Include pictures* of the problem area whenever possible.
- *Do not expose samples to extreme heat or cold* (such as leaving them inside a vehicle) and collect samples early in the week to avoid holding them over the weekend.

SUBMITTING A SAMPLE



Once samples have been collected properly, deliver them to your local county Extension office as soon after collection as possible. **Growers should not mail samples directly to the Plant Disease Diagnostic Laboratory.** Be prepared to complete a Plant Disease Identification Form with the information gathered from the site. In many cases, the local Extension agent can diagnose the problem on site. If necessary, the Extension agent or Extension staff assistant will ship samples to the Plant Disease Diagnostic Laboratory, following these general guidelines:

- *Mail samples as early in the week as possible.* If samples remain at the post office over the weekend, they may deteriorate and arrive in poor condition.
- *Cushion fragile samples* with newspaper and ship in a sturdy box.
- *Wrap roots and soil in plastic bags* to protect leaves from becoming contaminated with soil.
- *Never place moist paper-towels in boxes* with samples because the added moisture can hasten sample decay.
- If multiple samples are shipped in one box, each sample should be clearly labeled and a *separate, corresponding form* should be included for each sample.
- *Protect forms* by placing them in an envelope or plastic bag separate from the sample material.

SPECIFIC INSTRUCTIONS

Refer to TABLE 1 for specific instructions on how to collect and package various types of plant samples. Growers should contact their county Extension office if they have questions regarding the best type of sample to submit. Remember that delays in diagnosis occur when improperly collected and/or packaged samples are submitted for diagnosis.

TABLE 1. INFORMATION ON SAMPLING AND PACKAGING PLANT DISEASE SPECIMENS TO BE SUBMITTED TO THE PLANT DISEASE DIAGNOSTIC LABORATORIES.

Plant Material	Collection/Shipping Instructions
Seedlings*	
<ul style="list-style-type: none"> • All types 	<p>Select plants showing all stages of the problem, including some in early stages of disease development.</p> <p>Collect at least 10 to 12 seedlings, if possible, since they tend to deteriorate quickly. Dig up plants carefully to avoid damage to roots and leave soil attached to roots.</p> <p>Place in plastic bag. Soil should be moist but not saturated. Never add wet paper towels.</p> <p>Note: Since seedlings are fragile, you may decide to include a few extra plants with soil washed off. Place these in a separate bag.</p>
Whole plants	
<ul style="list-style-type: none"> • Field & row crops • Garden plants • Ornamental plants, trees & shrubs • Container-grown plants 	<p>Select plants showing all stages of the problem, including some in early stages of disease development. Include healthy plants for comparison if possible.</p> <p>Carefully dig up plants (do not pull) (2). Dig deeply enough to include the entire root system.</p> <p>Secure or tie off root ball in a plastic bag, so that foliage remains soil-free. For container-grown plants, either leave plants in the pot or remove them from it, but secure the root ball in a plastic bag. Tops of large plants may need to be bent or cut in sections for shipping.</p>
	

* These samples tend to be fragile and decay rapidly. Take extra care in collecting, packaging, and shipping.

TABLE 1 (CONT'D) INFORMATION ON SAMPLING AND PACKAGING PLANT DISEASE SPECIMENS TO BE SUBMITTED TO THE PLANT DISEASE DIAGNOSTIC LABORATORIES.


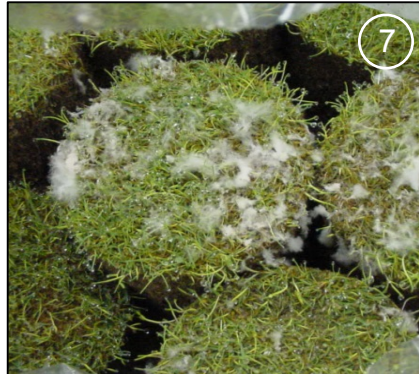
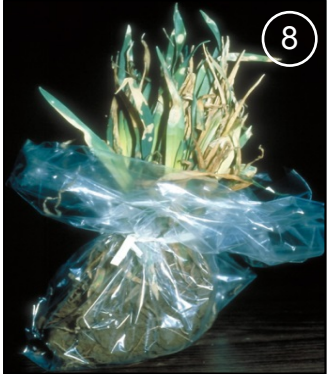

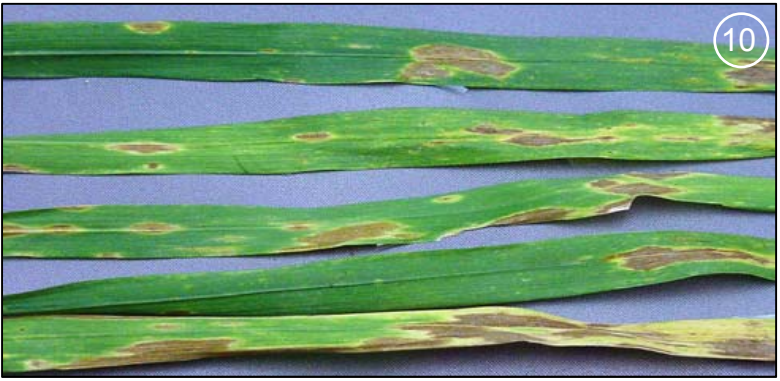
Plant Material	Collection/Shipping Instructions
Grasses (whole plants)	
<ul style="list-style-type: none"> • Pasture grasses & small grains • Turfgrass 	<p>Carefully dig up a clump of plants (do not pull). Dig deeply enough to include the whole root system. Leave soil around the roots. Try to include both healthy and affected plants in the sample (6).</p> <p>Secure or tie off root ball in a plastic bag, so that foliage remains soil-free (8). Tops of tall grasses or grains may need to be bent or cut in sections for shipping.</p> <p>Wrap samples of closely-mown turfgrass with soil in newspaper. Pad samples with more dry paper in a sturdy box to hold soil and plants intact.</p>
	 
Leaves only	
<ul style="list-style-type: none"> • Field & row crops • Garden plants • Ornamental plants, trees & shrubs 	<p>Collect multiple leaves that best represent problem (9 & 10).</p> <p>Layer leaves between dry newspaper or cardboard. Place loosely in a plastic bag. Never add wet paper towels.</p> <p>Label leaves to identify where on the plant they were collected (e.g. upper, middle or lower; oldest or newest leaves).</p>
	

TABLE 1 (CONT'D) INFORMATION ON SAMPLING AND PACKAGING PLANT DISEASE SPECIMENS TO BE SUBMITTED TO THE PLANT DISEASE DIAGNOSTIC LABORATORIES.







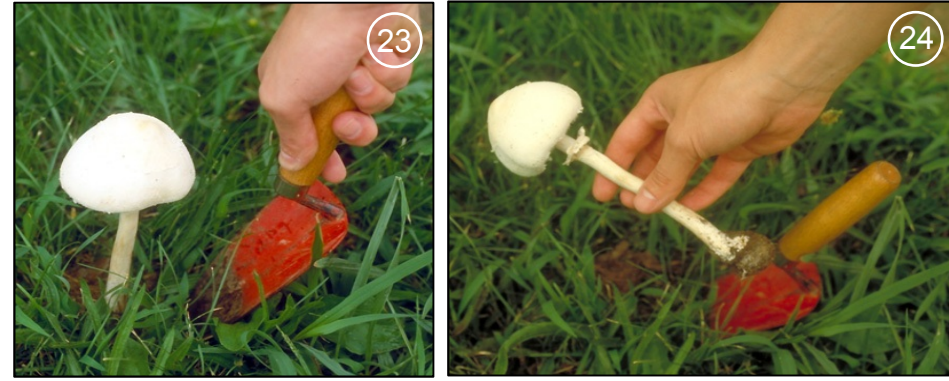

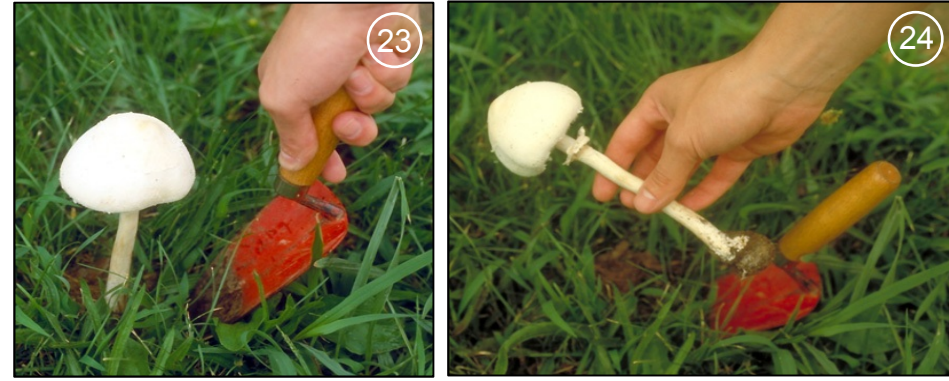
Plant Material	Collection/Shipping Instructions
Twigs, Branches	
<ul style="list-style-type: none"> • Trees and shrubs 	<p>Follow dead branches back until live tissue is found and collect well below the dead portion (11). Include any cankers (12).</p> <p>Large specimens may be cut into smaller sections for shipping.</p> <p>Wrap in dry newspaper or place loosely in a plastic bag (13).</p>  
Trunk	
<ul style="list-style-type: none"> • Trees and shrubs 	<p>Look for cankers, wounds or oozing areas. If tree is to be removed, cut sections of the trunk (14). If tree is still standing (no plans to remove), cut small pieces of bark and wood from the outer margin of a canker (15) or diseased area. Bark/wood samples should be at least 2 to 1" in size.</p> <p>Place in plastic bag.</p>  

TABLE 1 (CONT'D) INFORMATION ON SAMPLING AND PACKAGING PLANT DISEASE SPECIMENS TO BE SUBMITTED TO THE PLANT DISEASE DIAGNOSTIC LABORATORIES.

Plant Material	Collection/Shipping Instructions
Roots	
<ul style="list-style-type: none"> • Trees and shrubs • Container-grown plants 	<p>If the entire plant cannot be removed, root samples may be submitted along with branch samples. Carefully dig up segments of roots with soil intact (do not pull). Be sure roots are collected from the affected tree or shrub and not from understory plants. Put roots along with any attached soil in a plastic bag (17).</p> <p>Note: If the entire tree or shrub is to be removed, collect the whole root ball with the collar (base of stem) attached (18). This is a better sample than root segments only.</p>
	 
Fruits, vegetables, nuts & tubers*	
	<p>Select those showing the earliest signs of decay. Severely decayed material will not be usable (21).</p> <p>Gently dry the sample so that it is free of surface moisture.</p> <p>Wrap in newspaper (20). Place in a plastic bag to avoid leaking. Never add wet paper towels.</p>
	 

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TABLE 1 (CONT'D) INFORMATION ON SAMPLING AND PACKAGING PLANT DISEASE SPECIMENS TO BE SUBMITTED TO THE PLANT DISEASE DIAGNOSTIC LABORATORIES.

Plant Material	Collection/Shipping Instructions
Mushrooms for identification*	
<p>Select several at different stages of maturity when possible (22).</p> <p>Dig up specimen to include any below-ground structures (23 & 24).</p> <p>Wrap gently in newspaper. Place loosely in a plastic bag. Never add wet paper towels.</p>	
	
	

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Photos:

UNIVERSITY OF KENTUCKY *Paul Bachi (images 7, 9 & 10), Julie Beale (pg.1, images 4, 5, 13, 14, 20 & 21), John Hartman (image 12), Cheryl Kaiser (images 3,8, 17, 23 & 24), William Nesmith (image 2), and Nicole Ward Gathier (images 11 & 16)*

UNIVERSITY OF MINNESOTA COOPERATIVE EXTENSION SERVICE *Michelle Grabowski (image 1)*
 BUGWOOD.ORG. *William Brown (image 6), William Jacobi, Colorado State University (image 15), Florida Division of Plant Industry, Florida Department of Agriculture (image 18), and D. Powell, US Forest Service (image 22)*

WISCONSIN COOPERATIVE EXTENSION SERVICE *(image 19)*

Revised from the original fact sheet (PPA-9) written by BC Eshenaur, PR Bachi, WC Nesmith, JR Hartman, DE Hershman, PC Vincelli, and CA Kaiser