



ANR-450

ALABAMA A & M AND AUBURN UNIVERSITIES

Plant Diagnostic Lab Services

The Plant Diagnostic Labs of Auburn University can help you identify and treat your plant problems. Approximately 2,000 to 3,000 plant specimens and 2,000 to 3,000 nematode soil samples are processed each year at the labs. These plant specimens and soil samples come from a wide variety of crops including forages, fruits and nuts, ornamentals, turf grasses, vegetables, and field crops. In the year 2000, the Distance Diagnosis Digital Imaging (DDDI) program began with plant disease diagnosis. Images are sent from select county Extension offices and research/education centers to the Extension plant pathologists for disease diagnosis and recommendations. With the assistance of the Extension Computer Technology Unit, fourteen locations have been equipped for the program. Plans are to expand the digital capabilities to other county and research/education center locations and to include diagnosis capabilities in additional disciplines.

The two Alabama Cooperative Extension System Plant Diagnostic Labs are located on the Auburn University campus and at the C. Beaty Hanna Horticulture and Environmental Center at the Birmingham Botanical Gardens. The Auburn lab

receives plant samples for diagnosis and soil samples for nematode analysis from all areas of the state and from a wide variety of cropping and landscape situations. The Birmingham lab, which opened February 1, 2000, provides plant disease diagnosis and recommendations for the greater Birmingham area including Jefferson County and adjoining counties. Many of the samples received at the Birmingham facility are landscape ornamentals and turf. The Birmingham lab also receives digital images as part of the ACES DDDI program in plant pathology.

Plant specimens at both labs are examined for disease, insect, nutritional, cultural, and herbicide problems. Plant pathologists, soil and weed scientists, entomologists, horticulturists, and other Extension personnel are consulted as necessary in making diagnoses. These labs do not perform analyses for herbicide residues.

The accuracy of the diagnosis depends on the following:

- The size and condition of the plant specimen. Rotten, dry, dead, or incomplete plant specimens are worthless.
- The amount of information provided with the plant or soil sample. Be sure to describe the development of the problem. Use form ANR-89 (Auburn lab) or form ANR-89B (Birmingham lab) available at your county Extension office, if possible. These forms are also available online at www.aces.edu/dept/plantdiagnosticlab/ for the Auburn lab and at www.aces.edu/plantlabbbhm/ for the Birmingham lab.

Once the problem is identified, recommendations can be made. But recommendations may vary with the planting situation. With the plant sample, always

include information on the planting size and type (homeowner, production agriculture, etc.). Product labels, cost, and other practical considerations must be considered in making recommendations.

Your county Extension agent may be able to diagnose the plant problem, and so we encourage you to check with your county Extension office first. If the problem diagnosis requires microscopic study and/or other laboratory testing procedures, the sample may be sent to the Plant Diagnostic Lab at Auburn for analyses and recommendations. If you are located in Jefferson, Blount, Walker, Tuscaloosa, Bibb, Shelby, or St. Clair counties, you may take or send your samples to the Plant Diagnostic Lab at the Birmingham location. With some problems, input is needed from pathologists, entomologists, weed scientists, agronomists, and/or horticulturists. There is a service charge for plant samples sent for disease/problem diagnosis from Alabama residents. Out-of-state samples are charged at double the in-state rate. Normally, an invoice will be mailed with the diagnostic response. The exact charge depends upon the analyses required for the diagnosis. See rates on page 6.

When submitting soil samples for nematode analysis, include form ANR-F7, available at your county Extension office. Always follow recommended practices for collecting, packaging, and mailing samples. Nematode boxes and mailing cartons are available at county Extension offices. The charge for a soil nematode analysis is \$10 per sample. Out-of-state soil samples are not accepted.

You may send plants and insect specimens to the Plant Diagnostic Lab (at Auburn) for identification. These specimens are referred to Extension horticulture, agronomy, or entomology specialists. Weeds for identification should be sent to John Everest, 107 Extension Hall, Auburn University, AL 36849-5633. There is no charge for plant or weed identification. See page 6 for insect identification charges.

Samples for pesticide analysis should be sent to the Alabama Pesticide Residue Laboratory, 1081 South Donahue Drive, Auburn, AL 36832. It is preferred that samples be collected by an Agricultural Inspector from the Alabama Department of Agriculture and Industries. If you have questions, call (334) 844-4705.

Samples for soil/tissue analysis only should be sent to the Soil Testing Laboratory, ALFA Agricultural Services and Research Building, 961 South Donahue, Auburn University, Alabama 36849. Also see www.ag.auburn.edu/dept/ay/index.html.

Procedures for Plant Problem Diagnosis

Collecting Plant Specimens

An adequate sample that is representative of the damage must be collected. Collect intact plants if possible. Include roots, because above ground plant symptoms may reflect a root problem. Dig out (don't pull up) the plants, and leave soil attached. If intact plants cannot be collected, include plant parts that show damage. If possible, collect several plants or plant parts (fruits, nuts, twigs, leaves) representing different stages of the disease.

- When collecting spotted leaves from large woody ornamentals, collect 10 to 20 leaves that contain at least 20 spots or lesions.
- When collecting stem, branch, or trunk lesions or galls, collect at least 5 or more examples of the damage.
- When collecting lawn or turf specimens, take a sample from the edge of the affected area, providing both diseased and healthy plant material. Samples should be about 8 to 10 inches square by 3 inches deep.
- If you suspect a soil nutritional problem, send 1 pint of soil from the affected area and 1 pint of soil from a nonaffected area. Send foliage samples (to fill an 18-inch by 12-inch paper bag) from the problem area and from the healthy area (see table on page 4).
- **Keep specimens cool** if they must be held before packaging.

Packaging Plant Specimens

- Package specimens immediately after collecting them.
- When you collect whole plant specimens, wrap the roots in a plastic bag so that the foliage is not mixed with soil. This is especially important for field crops when nutritional foliage analysis is desired.

Tissue analysis will not be accurate if soil contaminates the foliage.

- Enclose the plant specimen with plastic-wrapped roots in a large plastic bag. **Do not wrap plants in a moist or wet paper towel.**
- When collecting plant foliage or foliage segments (except for fleshy fruits and vegetables; see below), enclose sample in a plastic bag. Seal the bag.
- Wrap fleshy fruits and vegetables (tomatoes, cabbage, Brussels sprouts, broccoli, etc.) in several layers of dry newspaper. **Do not** place them in a plastic bag.
- When sending a soil sample with the plant specimen, place the soil in a separate plastic bag.
- Pack the specimen well in a sturdy container (padded envelopes or boxes are best) to prevent crushing.
- Provide as much information as possible, using the diagnostic questionnaire (Form ANR-89 or 89B) available from your county Extension agent. If you need more space, use additional sheets of paper. The more information provided with the specimen, the more accurate the diagnosis and control recommendations will be.
- **Keep plant specimens cool** if they must be held before mailing.

Mailing Plant Specimens

Send the package to the Plant Diagnostic Lab, 164C ALFA Agricultural Services and Research Building, 961 South Donahue, Auburn University, Alabama 36849-5624 or the Plant Diagnostic Lab, 2612 Lane Park Road, C. Beaty Hanna Horticulture and Environmental Center, Birmingham Botanical Gardens, Birmingham, Alabama 35223, if you are located in or adjacent to Jefferson County.

If possible, mail your specimens during the first part of the week (Monday or Tuesday). Specimens mailed on Thursday or Friday may arrive in the lab on Monday morning in a decayed condition caused by secondary bacteria and fungi which grow under warm, humid conditions. Diagnosis is not possible on decayed samples.

Laboratory Procedure for Plant Problem/Disease Diagnosis

At the lab, the plant specimen is examined and compared to the symptoms described on the information sheet. This information is important, because damage to the plant during mailing can be confused with the real problem. The description of the problem enables us to focus on the original symptoms seen at the planting location.

Many of the plant specimens are studied under a microscope for evidence of a disease-causing agent. In some cases, pieces of the affected tissue are placed in a culture medium to allow accurate identification of agents causing the disease. Fungal or bacterial identification in culture requires one to several weeks. Some other diagnostic tests that may be needed in specific situations include ELISA (serological assay), a variety of bacterial characterization tests, specific microscopic staining techniques for viruses, and pathogenicity testing. The exact charge (\$10 to \$30; see page 6) and time needed for this additional testing depend upon the number and type of tests required for diagnosis. A written report and invoice will be sent when all testing is completed. See page 4 for more information on methods of response.

Extension pathology, entomology, agronomy, weed science, and horticulture specialists may be consulted for the diagnosis of the many unusual problems.

Procedures for Soil Nematode Analysis

Collecting Soil

- Collect 1 pint of soil from the root zone area of affected (but not dead) plants. Repeat this procedure in several locations in a suspect field. Then thoroughly mix the soil in a bucket or similar container.
- Do not collect extremely wet or dry soil. Dry soil is not acceptable for nematode analysis because the nematodes quickly die and decompose.
- For best results, collect soil samples for nematode analysis in late summer and fall, before cold weather arrives. During the cold winter months, many nematodes exist as eggs which cannot be detected by our analysis methods.

Packaging Soil

- Immediately after mixing, place one pint of soil into a plastic bag and seal the bag.
- Do not expose soil samples to extremely hot or cold temperatures.
- Do not allow soil samples to become dry.
- Place the plastic-wrapped soil in a nematode soil carton (available from your Extension agent) and provide the requested information on the carton.
- Also fill out the nematode analysis questionnaire (Form ANR-F7) which you can get from your Extension agent. Always indicate what crop is to be grown. Control recommendations cannot be made without this information.

Mailing Soil

Soil samples for nematode analysis should be mailed to the Plant Diagnostic Lab, 152A ALFA Agricultural Services and Research Building, Auburn University, Alabama 36849-5624. A \$10 fee is charged for each sample analyzed.

If possible, mail samples during the first part of the week. Samples mailed on Thursday or Friday usually remain in the post office during the weekend. Often, high summer temperatures will kill soil nematodes before the samples arrive in the lab on Monday.

Laboratory Processing and Analyzing Soil Samples for Nematodes

At the lab, a centrifugation sugar flotation technique for soil nematode extraction is used. Once extracted, the plant parasitic nematodes are identified and counted.

Control recommendations are based on the following:

- The types of nematodes present.
- The numbers of each type.
- The plants to be grown.
- The particular plant site situation (homeowner or commercial).

Plant Problem Diagnosis and Nematode Analysis Results and Recommendations

The diagnosis of most plant problems and the analysis of soil samples usually require 4 to 14 days (including return mailing time) from the time the sample is received. More time may be needed if the lab conducts fungal or bacterial tissue cultures.

A written report of the diagnosis/analysis and recommendations is mailed when the testing is completed. Situations requiring an immediate response are handled by telephone. Some samples may be

Table 1. Sampling Instructions for Plant Nutrient Analysis

Crop	Plant Part/Amount To Send	Crop	Plant Part/Amount To Send
Alfalfa	Top 6" of plant prior to blooming /20-30 plants.	Small grain (wheat)	Top 6" of plant leaves prior to heading/growth state 4-6 (early tillering-stem elongation)/1 lb. fresh weight.
Corn (leaves)	Leaf below whorl and ear leaf at silking/10-20 leaves.	Soybeans	Top mature leaves prior to or at initial pod filling/30-40 leaf blades.
Corn (seedling)	Whole top up to 12"/5-10 plants.	Ornamentals	Young mature leaves in mid summer/30-40 leaves.
Cotton	Top mature leaves in June or July/20-30 leaves.	Pecans	Middle pair of leaflets in July from compound leaves in the middle of the current season's shoots/100 leaflets.
Forage grasses	Top 4-6" of plant/1 lb. fresh weight minimum	Perennial fruit	Young mature leaves immediately after harvest/30-40 leaves.
Grain sorghum	Whole plants up to 12"/5-10 plants; or uppermost mature leaves on older plants up to milk state/30-40 leaves.	Vegetables	Uppermost mature leaves prior to fruiting/20-30 leaves.
Peanuts	Top mature leaves prior to or at bloom/50-60 + leaflets.		

brought to the lab personally by the owner; in some situations, these “walk-in” samples may be handled and responded to immediately. When plant specimens are referred to the Plant Diagnostic Labs from county Extension offices, responses are often sent by electronic communication (e-mail). For client plant samples, the diagnostic response is mailed directly to the client along with the service charge invoice. When county Extension agents are involved, they will also receive an electronic mail copy of the response. Occasionally, response letters are faxed upon request.

Procedures for Insect Identification

Insects sent for identification must be properly collected, packaged, and mailed.

- Collect whole insects in good condition. Collect as many insect stages as possible, such as eggs, larvae, pupae, and adults.

- Place insects, except caterpillars, in 70 percent isopropyl alcohol immediately, but keep moths and butterflies intact in small containers or wrapped with plastic or paper.

- Put caterpillars and spiders in boiling water before placing them in alcohol.

- Fill out the Insect Identification Record (available from your county Extension agent) with as much information as possible. Include the following: date collected, place collected (address and type of host or site: crop, yard, home, person); exact host or crop; extent or type of damage; name of person who collected the insect.

- If the insect was causing plant damage, include a plant specimen showing evidence of the plant injury. See **Procedures for Plant Problem Diagnosis** for details.

- Place the insect container or package in a mailing tube or other protective package and mail to the Plant Diagnostic Lab, 169 ALFA Agricultural Services and Research Building, 961 South Donahue Drive, Auburn University, Alabama 36849-5624.

- If the sample requires an immediate reply, a specialist will respond by telephone. A delayed reply (phoned or written) may be the result of the travel

schedule of the specialist or incomplete information submitted with the sample.

In some cases, insect identifications must be referred to the USDA Insect Identification Lab in Beltsville, Maryland. Replies from Beltsville usually require 3 to 5 weeks.

Procedures for Weed Identification

To identify weeds, a complete plant or a specimen containing leaves, stem, roots, and flowers (or seedheads in the case of grasses or grasslike plants) or fruit is absolutely necessary. The success of each identification depends to a large degree on the condition of the plant material at the time of identification. Decomposed, dry, or incomplete plant specimens make identification difficult, if not impossible. Adequate specimens with flowers or fruit usually produce positive results. The following points will help in the identification process and in making control recommendations.

Collecting Weed Specimens

- Collect and submit intact plants, if possible. If the weed is small, collect several plants.

- If the weed has flowers and/or fruit present, collect plants that have these parts.

- If the weed is too large to submit, send samples of the roots, stem, leaves, flowers, and fruit. Please indicate the size (height) of the plant.

- In some plants, especially grasses, it is necessary to have the flowers or seedheads. Otherwise, only a general identification can be made.

Packaging and Mailing Specimens

- Do not let the plants lie around for several days before packaging.

- Place the plant(s) or plant parts in a plastic bag and seal.

- Pack the plastic bag in a shipping container that is sturdy and large enough to prevent crushing the specimen during transit.

- Label the package **WEED ID** and mail to John Everest, 107 Extension Hall, Auburn University, Alabama 36849.

- If the plant sample is not a weed but an unknown plant, mail it to the Plant Diagnostic Lab, 164C ALFA Agricultural Services and Research Building, 961 South Donahue Drive, Auburn University, Alabama 36849-5624.

- Any other pertinent information that might influence the control recommendation, such as location and proximity of desirable plants in the area; use of the pond, such as swimming, fishing, or irrigation; size and degree of weed problem; etc.

Additional Information

The following information should be included with each specimen:

- Location or crop where weed was collected.

For example: roadside, forest area, cotton field, edge of pond, St. Augustine lawn, fescue pasture, etc.

Charge Schedule for Plant Diagnostic Lab Services

Plant Samples for Disease Diagnosis	
Homeowner samples	usually \$10 or \$15
Commercial samples.....	usually \$20 or \$25
Some molecular analyses are \$30. The client will be consulted before the analysis is done.	
Soil Samples for Nematode Analysis	
Soil Nematode Analysis	\$10
Insect Samples	
Routine.....	\$5
Identification requiring a slide mount for microscopy.....	\$10
Commercial/industrial.....	\$20
Plant or Weed Identification	
No charge	



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For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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