UGA Soil Testing Laboratory
Virtual Tour

By
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Soil, Plant, and Water Laboratory
Soil sample
- Its journey from the field to the extension office/laboratory and back to the field...

Collection → Submission → Analysis

Healthy crops/ productive farms

Recommendation
Soil Sample Collection

• Divide area according to vegetation and soil characteristics. Yellow dots indicate sampling points.

• Use a zigzag approach when taking samples. Collect 8-10 soil samples from each location (zone).

• For trees and shrubs, take soil samples from six to eight spots around the drip-line of the plants.
Sample delivery to the laboratory

- Soil samples from Extension offices delivered to the lab by postal service, UPS or Fed Ex. Few samples dropped off by clients living nearby.

- Each box is scanned by the lab and reconciled against the courier’s record before affixing signature for sample receipt.
Samples are sorted and checked against submission form

- Boxes are opened and samples are counted and matched with accompanying submission form.

- Once paperwork and samples are in order, sample bags are arranged and wire seal tops are removed. This allows quicker drying of samples.
Samples are grouped into sets - 36 samples/set

- Soils are arranged and grouped into 36 in a set box. Each box has an ID that includes the set number, date, and tests required.

- Typically, soil samples from various locations may differ in properties as shown by their varying colors, texture, and amounts of organic matter.
Soils are dried at 110°F for 12 hours or until dry in a walk-in oven.

The next day, soil samples are crushed using a stainless steel grinder and passed through a screen with 2 mm openings (U.S. Screen Series #10).
**Unground and ground samples - difference**

- Unground and unscreened samples have pebbles, clods, plant parts including roots.

- Ground and screened samples look uniform in size and, therefore, more homogeneous.
Scooping for Mehlich (mineral) extraction

- Mehlich extraction for routine test provides data on phosphorus, potassium, calcium, magnesium, manganese, and zinc.

- The Mehlich extraction uses 4 milliliter (mL) scoop soil and 20 mL Mehlich solution.

- It is important that soils are properly scooped.
Mineral extraction using Mehlich I solution

- The samples are placed on a shaker for 5 minutes. Shaking allows good mixing of soil and solution.

- The mixture is filtered to separate the soil particles from the liquid.
Filtration Step

• Soil particles remain on the filter paper.

• Clear liquid passes through the filter paper.
Pouring up Step

• Spent filter papers are removed from filtration flasks, and extracts are transferred to vials.

• The vials are arranged around a carousel following a specific order. This carousel holds soil extracts from check and client samples, duplicate extracts, and blanks.
Vials with extracts are loaded on the machine (Inductively Coupled Plasma Spectrometer - ICP) to analyze for phosphorus, potassium, calcium, magnesium, manganese, zinc, and other elements.

It takes 20 seconds to analyze each extract. The data generated is automatically saved and transmitted to the database for the reporting.
Scooping for soil pH

- Larger soil volume (20 mL) is scooped into Dixie cups. Check soils and duplicates included.

- The set is loaded on the reagent dispenser. Each cup receives 20 mL of 0.01 M CaCl2.
Robotic pH Meter and Data Handling

- Soil pH sets are loaded on the robotic pH meter. All data generated are automatically saved to the computer.

- pH electrodes are kept clean, calibrated, and properly maintained for accurate pH readings.
Quality Assurance/Quality Control

- Check soil samples are collected from farmer fields, composited, homogenized, and analyzed many times. Average values are calculated and used in flagging data.

- The AESL participates in several proficiency testing programs to check the quality of its data and operations.
Soil Test Report

- **Regular farmer soil test report** – bars are labeled low, medium, high, and very high.

- **Homeowner soil test report** – bars are labeled nutrients needed and nutrients not needed.
County Delivery System

1. Farmer collects samples and submit to extension office.
2. Extension office sends report to the client.
3. Extension office sends samples to the lab; lab receives and check submission.
4. Lab analyzes the samples.
5. Lab releases reports to the extension office.
6. Lab generates reports with recommendation.
7. Lab analyzes samples.
Data Transfer for agents and secretaries
This program was initially offered to South Georgia ag counties to keep shipping costs down and get samples to the lab quicker. Currently, there are 45 south and 3 northwest Georgia counties enrolled in the program. Any county wishing to use UPS pick-up for the upcoming fiscal year will need to enroll in the CampusShip program. This will require payment of $500 to the Soil, Plant, and Water Lab.

In order to be eligible for UPS pick-up, your county must contact Michelle Doster at the Soil, Plant and Water Lab as soon as possible:
   Email: dmd7096@uga.edu
   Phone: 706-542-5350

If we do not receive payment by June 30 or hear from you that a check will be sent, your UPS CampusShip account will be canceled. This applies to counties with existing CampusShip accounts only. If you are enrolled in WorldShip or have a different UPS account, it will not be affected.
In order to use CampusShip, the county needs a scale to record the weight of the sample to be shipped – a bathroom-model scale is sufficient. This weight must be entered into CampusShip, along with other information, when shipping a package.

The new UPS rules state that additional handling fees will accrue for the following:

- if any package’s weight exceeds 70 pounds
- if any package’s longest side exceeds 60 inches
- if the package’s second longest side exceeds 30 inches

Excess charges for packages exceeding these weight and size limits will be billed to the counties.
CampusShip also requires a reference code (see below). There are separate reference codes for each of the Plant Disease Diagnostic Labs at Tifton, Griffin, and Athens, for the Feed and Environmental Water Lab, for the Pesticide and Hazardous Waste Lab, and for the Soil, Plant and Water Lab. Each code is linked to its correct shipping address.

<table>
<thead>
<tr>
<th>Lab Name</th>
<th>Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil, Plant, and Water Lab - Athens (SPW)</td>
<td>Soil, plant tissue, water, animal waste, sludge, cotton petioles</td>
</tr>
<tr>
<td>Feed and Environmental Water Lab - Athens (FEW)</td>
<td>Feeds, forages, foods, feed ingredients, natural waters, industrial wastewater</td>
</tr>
<tr>
<td>Pesticides Lab - Athens (PHW)</td>
<td>Insecticides, herbicides, hazardous materials</td>
</tr>
<tr>
<td>Plant Disease Clinic - Athens (PDCA)</td>
<td>Christmas trees, commercial fruit and ornamentals, forestry, homeowner samples, legume forages, mushrooms, turf and small grains, urban ornamental landscapes, wood rots</td>
</tr>
<tr>
<td>Plant Disease Clinic - Tifton (PDCT)</td>
<td>Tobacco, pecan, cotton, soybean, peanut, corn, kenaf, commercial vegetables</td>
</tr>
<tr>
<td>Nematode Lab - Athens (NEMA)</td>
<td>All samples for nematode analysis</td>
</tr>
</tbody>
</table>
Free shipping only applies to routine soil samples from counties enrolled in CampusShip. Shipping charges for routine soil samples are covered by the $500 county UPS pickup fee.

The counties must collect fees from the clients to cover shipping charges for all other samples sent to the Soil, Plant and Water Lab (non-routine soils, water, plants, animal waste, etc.), the Department of Plant Pathology, the UGA FEW Lab, and the UGA PHW Lab. This money should be deposited into the county’s account. Michelle Doster will bill the county monthly for these shipping charges.

Email soiltest@uga.edu if you have more questions.
If you haven’t received a User ID/Password for accessing CampusShip, contact soltest@uga.edu. You will usually receive a response within an hour.

If you forgot your password, click the “Forgot your password?” link and follow the instructions.

If you have trouble accessing CampusShip, call their Help Desk number: 1-800-513-1819


2. Where is this shipment going?
   - Click Corporate Address Book, then Show All. Select the destination.

3. Where is this shipment coming from?
   - Don’t make any changes.

4. What are you shipping?
   - Enter the number of packages, and choose Other Packaging.
   - Enter the weight.
   - Leave Package Dimensions blank unless it’s an odd-size package.

5. How would you like to ship?
   - Choose UPS Ground Service.

6. Would you like to add reference numbers to this shipment?
   - Enter Free if primarily routine soils.

7. How would you like to pay?
   - Don’t change. Even though it shows your account, the bills should come to us. Let us know if you get any bills.
AESL Website

Agricultural & Environmental Services Laboratories

Resources

- General
  - Locate your County Office
  - Fee Schedule

- What's new

- Extension Agents & Secretaries
  - Submission Forms
  - Monthly Billing
  - UPS CampusShip
  - Sample Containers
  - Crop Code List
  - Chlorine Test Kit Promotion
  - Hydrogen Sulfide Test Kit

- New Tests for Horse Industry
  - Nonstructural Carbohydrates (NSC) Circular
  - Horse Test Packages

- UGFFerex
  - (supports Internet Explorer only)

Publications

- Soil Test Handbook for Georgia
- Crop Code Sheets
- Feed and Forage Publications
- Plant Analysis Handbook for Georgia
- Household Water Quality Publications
- Soil Test Publications and Tools
- Quality Assurance/Quality Control
- More Publications

Online Calculators

- Fertilization Calculator: N-P2O5-K2O
- Nitrogen Availability Calculator

Our Services

We provide testing for:

- Soil analysis
- Plant tissue analysis
- Water quality
- Animal Waste
- Feeds and forages
- Biosolids
- Microbiology
- Pesticides and hazardous waste
- Special analysis
- Waste water

Our Labs

The Agricultural and Environmental Services Laboratories (AESL) are comprised of four cooperating units:

- Soil, Plant, and Water Lab
- Feed & Environmental Water Lab
- Crop and Environmental Quality Laboratory

Our Mission

The mission of the Agricultural and Environmental Services Laboratories (AESL) is to provide objective analytical services to agricultural producers, consumers, and agribusinesses.

Read more

Tour our Facilities

If you’re ever in the Athens area, we’d love to show you our labs. We can give tours for school groups. Extension agents and secretaries, or other laboratories. Since this is a working laboratory, we need to keep group sizes relatively small, and a tour would not be appropriate for elementary or middle school students.

Send us a message if you would like to schedule a tour:

- Lab Images
- Maps and Directions

Lab History

Soil testing is the oldest of the Extension laboratories. It began in 1951 as a mobile laboratory on wheels.

Read more
Tools for Agents to Promote Soil Testing by Urban and Non-Farm Clientele in Georgia

Soil test video  Soil test kit  Website
Soil Testing
For Home Lawns, Gardens, and Wildlife Food Plots

Background
Developing and maintaining productive soils begin with soil testing. Soils tests provide information on the soil’s actual nutrient status. Test results are used to determine the amount and kind of nutrients that should be added for the best growth of lawn, garden, and other types of plants.

Samples should be air dried overnight before sending them to the UGA Soil Testing Lab. Dry samples on a flat surface lined with clean white paper. Care should be taken to avoid contamination. After drying, transfer the sample to the soil sample bag and prepare it for mailing to the lab.

Q: When and how often should soils be tested?

A: Soils can be tested any time during the year. However, allow enough time for the analysis and for fertilizer and lime application. Lime reacts slowly, and if possible, it should be mixed with the soil 2-3 months before planting. Generally, fall is the most desirable time to sample because landscapes and gardens are usually dry and easily accessible.

Once medium or high fertility levels are established, lawn and ornamental areas need to be sampled every two to three years.

Vegetable gardens should be sampled every one to two years.

SOIL TEST KIT
For Home Lawns, Gardens and Wildlife Food Plots

Background
Developing and maintaining productive soils begin with soil testing. Soils tests provide information on the soil’s actual nutrient status. Test results are used to determine the amount and kind of nutrients that should be added for the best growth of lawn, garden and other types of plants.
Plant Analysis Handbook for Georgia

C. Owen Plank, Extension Agronomist - Soil Testing & Plant Analysis, retired

http://aesl.ces.uga.edu/publications/plant/
Commonly asked questions

• How much of a sample is needed for analysis? – Fill line on sample bag


• Where/How do I order supplies? - Order supplies from: [http://www.caes.uga.edu/Applications/SupplyList/](http://www.caes.uga.edu/Applications/SupplyList/)

• How do I order a soil probe? – call the Soil Lab 706-542-5350

• What form do I use when submitting a “special” sample? [http://aesl.ces.uga.edu/forms/checksub.pdf](http://aesl.ces.uga.edu/forms/checksub.pdf)

• Is it ok for me to ship a sample on Friday, knowing it won’t get to the lab until, at the earliest, Monday or Tuesday? – it depends on the sample
  • Soil for routine – yes!
  • Others - No
Thank you.

- From the AESL Staff