Soil Testing

Cooperative Extension Service/The University of Georgia College of Agricultural and Environmental Sciences

C. Owen Plank, Extension Agronomist

Determining the fertility level of a soil through a soil test is the first step in planning a sound lime and fertilization program. This step leads to higher crop yields and quality by following recommended application rates. A soil test provides the means of monitoring the soil so deficiencies, excesses and imbalances can be avoided.

Many Georgia soils are low in pH and one or more of the essential plant nutrients. Therefore, to maintain normal plant growth, lime and fertilizer must be supplied in sufficient quantity to meet the crop's requirement. A soil test will determine the soil's contribution to the crop requirement, with lime and fertilizer supplying the remainder.

The Soil Testing Laboratory

The Soil Testing Laboratory is located on the campus of the University of Georgia at 2400 College Station Road in Athens. It is equipped with the most modern instruments available for rapid and accurate soil analysis. Analysis results and fertilizer recommendations are returned to your county extension agent for dissemination and adjustments, if necessary.

The laboratory offers a number of tests to meet specific soil and cropping circumstances. The tests and their applications are listed in Table 1 (page 3).

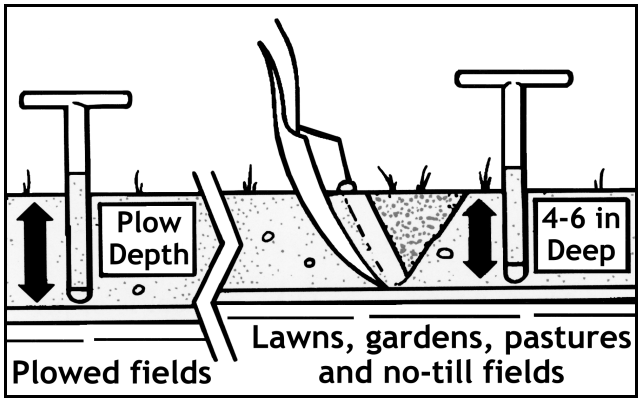

Figure 1. Take a thin vertical slice to desired depth.

Procedure

Use soil sample bags – available from your county extension office – for submitting samples to the laboratory. Supply all the information asked for on the sample bag.

List your **NAME AND ADDRESS, CROP** to be grown, **SAMPLE NUMBER** (please make these simple and do not exceed three digits, e.g., 1, 2, 3 ... 20, 21, 22 ... 321, 322, 323 ... 32A, 32B ...) and your **COUNTY AGENT'S ADDRESS.** This information is essential for the return of your sample results and fertilizer recommendations to the proper county extension office.

On the bag, indicate the tests you want by checking the appropriate space and/or spaces. For most agronomic needs, a routine test will be enough. If you are in doubt about whether to request a special analysis (OM, NO_3, B) refer to Table 1 or consult your local county extension office.

Sample Instructions

When soil samples are submitted to the laboratory for analysis, reliable analytical results are necessary for making limestone and fertilizer recommendations. A soil test result, however – regardless of analytics – can be no better than the sample submitted for analysis. For the sample to be representative of the area tested, follow these steps for sampling:

1. Use a soil sampling tube, auger, spade, trowel or other tool that can take a thin, vertical slice of soil to the desired depth (Figure 1).

2. Take at least 15 to 20 cores or thin slices at random over the field or area (Figure 2). In general, 15 acres should be the maximum size area represented by a single composite sample. Place the cores in a clean plastic bucket or other non-metal container and thoroughly mix the soil. Fill the soil sample bag to the "fill line" marked on the bag. Fold the top of the bag and fasten the

metal flaps securely to avoid spillage during shipment. Note: Do not use a galvanized bucket for collecting samples, especially if the soil is to be analyzed for zinc or other micronutrients. Ensure that buckets and sampling tools are clean and free of fertilizer and limestone residues. Even a small amount of fertilizer transferred from the sampling tools to the soil can seriously contaminate the sample and produce misleading results.

3 The area included in the sample should have been uniformly fertilized and limed in the past. When collecting the sample, avoid small areas where the soil conditions are obviously different from those in the rest of the area – for example, wet spots, areas where wood piles have been burned, old building sites, fence rows, fertilizer bands, eroded areas and areas immediately adjacent to roads. If a field contains more than one soil type, collect separate samples from each soil area. Sample problem areas within a field separately (Figure 2).

4 Depth of sampling will vary depending on the crop or cropping conditions. The following sampling depths are recommended:

	Sampling Depth
Plowed fields	plow depth
No-till fields	4 inches
Pastures	4-6 inches
Orchards	8-12 inches
Lawns	4 inches
Gardens	6 inches

5 When sampling greenhouse benches or pots, collect a core of soil from the surface to the bottom of the pot. Collect from several areas or pots to provide enough soil to fill the sample bag ¾ full.

When to Sample

Soil samples can be taken any time during the year; however, fall is the most desirable time. Soils should be dry enough to till when sampling, and fields are usually dry and easily accessible in the fall. The soil pH and nutrient levels will be at or near

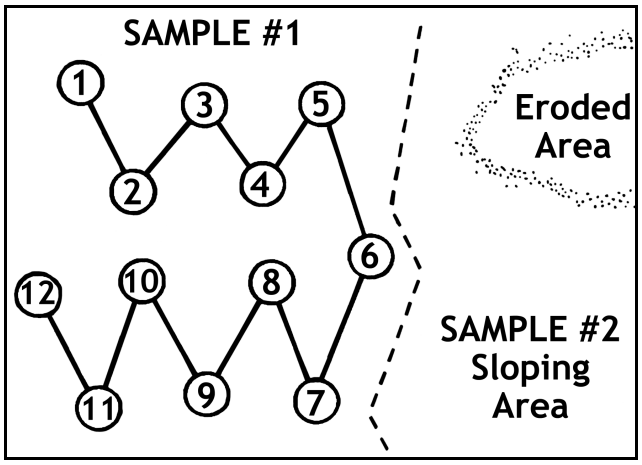

Figure 2. Soil Sampling Scheme

their lowest points during late summer and early fall. Therefore, samples collected in the fall are more representative of the actual fertility conditions during the growing season than samples collected in late winter or early spring. Fall sampling also allows sufficient time for results and recommendations to be received from the laboratory so needed limestone and fertilizer can be applied before planting.

Soil nutrient levels change during the year depending on the temperature and moisture content of the soils. It's important, therefore, that samples be taken at or near the same time each year, so results from year to year can be compared.

How Often to Sample

For many situations, test soils every two to three years. However, test the soil when there is a suspected nutrient deficiency, once per crop rotation, or once every other year if the soil is fertilized and cropped intensively. Annual sampling is recommended (1) on areas where high-value cash crops such as tobacco and vegetables are grown and (2) on areas where the annual nitrogen application rate exceeds 150 pounds of N per acre. Collect soil samples also following crops where large amounts of nutrients are removed in the harvested portion of the plant, especially for silage crops, hybrid bermudagrass hay, and where peanut vines are used for hay.

Record Keeping

Keep previous soil test results for each field and refer to them when you plan limestone and fertilizer applications. The fertility level of a soil is similar to a bank account: If the amount deposited exceeds the

amount withdrawn, there is a net buildup of the account. If the amount of nutrients applied in fertilizer and limestone exceeds the amount removed in harvested crops and the amount lost by leaching, there will be a net buildup of the soil fertility level. If the opposite is true, the fertility of the soil will decline. Periodic soil sampling of each field will help determine whether you are following a soil buildup or soil depletion program. If a sound soil testing program is not followed, a deficiency or an excess in fertilization rates can result.

Laboratory Tests and Fees

1. **Routine Tests:** pH, L.R., Soil Test P, K, Ca, Mg, Mn and Zn
2. **Micronutrient Tests:** Boron (B)
3. **Other Tests:** Organic Matter Content, Soluble Salts, Nitrate Content
4. **Commercial Greenhouse or Nursery Soil Test:** pH, Soluble Salts, NH_4, NO_3, P, K, Ca, Mg

The laboratory charges a nominal fee (subject to change) for these analyses. Please contact your county extension office for the most recent information about current fees.

A check to cover cost of tests should accompany the soil sample and be made payable to the Cooperative Extension Service.

Table 1. Selecting the Proper Soil Test Determination

Not all the soil tests apply equally to every soil and cropping situation. Suggestions for selecting the proper soil analysis and/or analyses are as follows:

ROUTINE TEST:	
pH, Lime Requirement (L.R.), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), Manganese (Mn), Zinc (Zn)	Routinely recommended for all commercial field and vegetable crops as well as lawns and gardens
MICRONUTRIENT TESTS:	
Boron (B)	Primarily for sandy or eroded soils low in organic matter on which cotton, peanuts, alfalfa and vegetable crops are to be grown.
OTHER TESTS:	
Organic Matter Content (O.M.)	For all soils and crops, knowing the O.M. content is of primary interest for special situations where soil tilth and water-holding capacity are important.
Soluble Salts (S.S.)	Of interest where large quantities of fertilizers have been applied, particularly for potted plants, greenhouse beds, lawns or ornamental plantings or beds. Not generally applicable to field soils except in problem-solving situations.
Nitrate Content (NO_3)	Of particular interest for greenhouse soils, potted plants and beds. Not generally applicable for field soils. However, as more interest in pollution from fertilizer sources develops, this test may become more important in field crop situations. As the residual NO_3-N level of a soil increases, the application rate of fertilizer nitrogen should be adjusted downward.
COMMERCIAL GREENHOUSE OR NURSERY SOIL TEST:	
pH, Soluble Salts, NH_4, NO_3, P, K, Ca, Mg	For mixes that include soil, sand, peat, pine bark, pearlite, vermiculite used to produce greenhouse or potted vegetable, flower or ornamental plants. Not recommended for unamended soil.

When you have a question ...
Call or visit your local office of The University of Georgia's Cooperative Extension Service.

You'll find a friendly, well-trained staff ready to help you with information, advice and free publications covering agriculture and natural resources, family and consumer sciences, 4–H and youth development, and rural and community development.

Leaflet 99 **Reprinted March, 2000**

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, The University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture cooperating.

Gale A. Buchanan, Dean and Director