

**When shipping several types of agronomic samples, package each type separately.** For example, place soil samples in one package, nematode assay samples in another package, and plant/waste/solution samples in yet another package. Make sure the address on each package includes the name of the specific laboratory to which you are sending the samples.

**Soil test reports are posted on the Internet as soon as they are available.** Just select “Find Your Report” from the left navigation bar on the Agronomic Division’s Web site [www.ncagr.com/agronomi](http://www.ncagr.com/agronomi). You will also receive a copy of the report in the mail. For help interpreting reports, contact your NCDA&CS regional agronomist.

### **For additional information, contact**

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[www.ncagr.com/agronomi](http://www.ncagr.com/agronomi)

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## Agronomic Division

# Soil Testing



*Enhancing  
Land Productivity,  
Nutrient Use Efficiency,  
& Environmental Quality*

**N.C. Dept. of Agriculture  
& Consumer Services**

### **Reasons for Soil Testing**

In North Carolina, most soils are naturally acidic and low in nutrients; therefore, fields require both lime and fertilizer to support optimal plant growth and yields (Fig. 1). Soil testing provides science-based lime and fertilizer recommendations for specific crops and field conditions.

The management of soil fertility without soil testing is unwise since soil nutrient and pH relationships are complex. Acid soils, for example, can limit root growth and cause certain nutrients to be unavailable for plants. Unless soil acidity and pH are corrected through liming, applying fertilizer may not correct the problem.

Soil testing measures the soil’s nutrient-holding capacity and provides a sound basis for land management decisions. Fertilizer recommendations based on soil test information optimize crop yield, save money and protect the environment from excess fertilizer runoff. Following recommendations for lime application can produce similar benefits.

### **Types of Soil Tests**

The Agronomic Division of the N.C. Department of Agriculture and Consumer Services conducts soil tests free of charge for all state residents. The tests can be either *predictive* or *diagnostic*.

Predictive (or routine) soil tests estimate the nutrient requirements of the next crop. Samples are taken before the growing season and analyzed for soil pH, acidity and nutrient levels. The report provides site-specific recommendations based on soil class, current pH, fertility levels, and crop requirements.

Diagnostic (or problem) soil tests identify nutrient-related problems that occur during the growing season. Analysis is the same as for predictive samples, except soluble salt levels are also measured. The recommendations help growers and crop consultants adjust fertilization according to site-specific demands.

### **Importance of Representative Samples**

Improperly collected soil samples are the weak link in the soil testing process. For test results to be useful, *the sample must accurately reflect the conditions in the*

*field*. A sample from a single spot cannot represent the overall variation within the field. If a sample is not representative of the field, laboratory accuracy and precision are worthless.

### **A Strategy for Collecting Samples**

Before sampling, make a detailed map of your land. For small areas, simply draw a diagram. For large tracts, aerial photographs may be helpful.

Divide the map into individual sample areas of 20 acres or fewer. Assign a short, permanent sample identification name to each area that will help you remember its location. Keep in mind that the sample ID space on the soil test box is limited to five characters.

Each sample area should consist of only one general soil type or condition. If a field varies in slope, color, drainage or texture—and if those areas can be fertilized separately, submit a separate sample for each area (Fig. 2).

If the field being sampled has been divided into sections for various crops, submit a sample for each section—even if you now plan to grow the same crop across the entire field. Areas where liming or fertilizing patterns have differed from the rest of the field should also be sampled separately.



**Figure 1. Nutrient management is critical for optimum crop production.**

## When to Collect Samples

Collect and submit samples three to six months before a projected planting date if you want to be able to base fertilizer plans on a current soil test report. For farmers, submitting samples immediately after fall harvest is advisable. The laboratory's busiest season is November through March when most farmers' samples are processed. Anyone who can submit samples from April through October is more likely to avoid delays.

## How to Collect Routine Samples

Essential tools for collecting soil samples include a plastic bucket and a shovel or a soil probe. Do not use brass, bronze or galvanized tools because they can contaminate samples with metals. Clean the bucket and tools before collecting samples to prevent small amounts of lime and fertilizer residue from contaminating the sample and distorting test results.

The correct depth for a sample depends on the cropping situation (Fig. 3). For cultivated row crops or vegetable

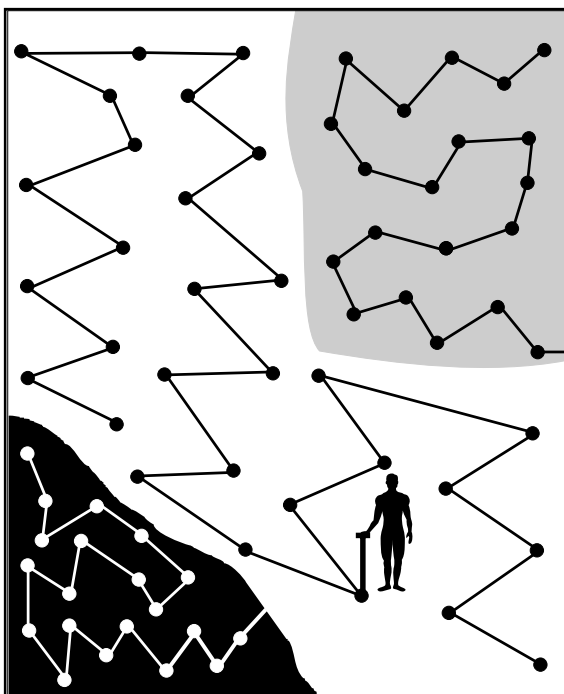


Figure 2. Sampling patterns for a field with three distinct soil types.

gardens, sample to the depth you would plow, normally 6–8 inches. This is the zone where lime and fertilizer are incorporated. For established pasture and turf—as well as for established minimum-tillage or no-till operations, sample to a depth of 4 inches. In the establishment of these systems, however, sample to an 8-inch depth.

Collect soil cores with a probe at 15 to 20 random locations across a field (Fig. 2). Zigzag patterns help ensure that samples accurately reflect overall field conditions and variability. Although a soil probe is ideal, cores can be collected with a shovel as follows: remove soil forming a small hole, cut a one-inch thick cross-section of soil from the wall of the hole to the proper sample depth, and carefully place the soil in the bucket.

To ensure a representative sample, avoid taking cores from small areas where soil conditions differ substantially from those in the rest of the field—for example, wet spots, severely eroded areas, old building sites, fence rows, spoil banks, burn-row areas, and old woodpile or fire sites. Also, avoid fertilizer bands where row crops have been grown. Cores from these spots can adversely influence soil test results and recommendations.

For each sample, collect and thoroughly mix at least 15 cores in a clean plastic bucket. Using this mixture, fill a standard soil sample box completely full. You can use extra soil left in the bucket for a nematode assay sample.

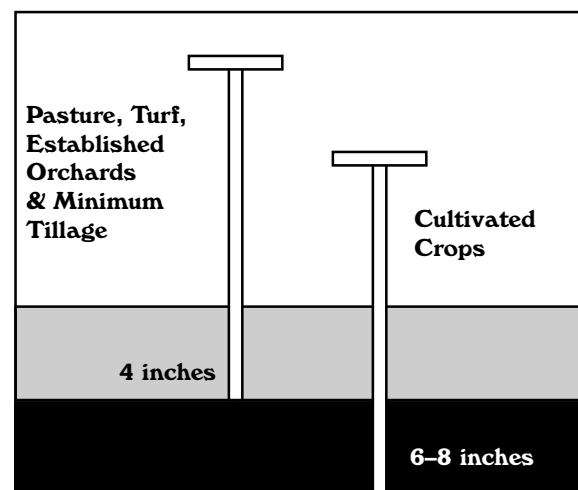


Figure 3. Proper sampling depth varies depending on the kind of crop you plan to grow.

Contact the Agronomic Division for information on handling and submitting samples for nematode assay.

Supply all information requested on the box and the appropriate information sheet. Use *Soil Sample Information* (white form AD-1) for routine samples and *Diagnostic Soil Sample Information* (orange form AD-2) for problem samples. Boxes and forms are available from NCDA&CS regional agronomists, the Agronomic Division in Raleigh, Cooperative Extension offices, and local agribusinesses.

## How to Collect Problem Samples

When using soil samples to troubleshoot a potential plant nutrient problem, a more thorough sampling strategy is necessary. In addition to collecting topsoil (as indicated in Fig. 3), also collect subsoil samples 8- to 16-inches deep. Be sure to keep topsoil and subsoil samples separate and labeled appropriately.

In both instances, follow the guidelines for collecting a representative sample. Take cores at random locations throughout the problem area even though it may be relatively small. In addition, collect a representative sample from normal areas of the same field. By comparing the soil's chemical composition between normal and affected areas and at various depths, staff agronomists may be able to pinpoint your problem.

## How Often to Sample

In most cases, it is not necessary to take soil samples every year. In the coastal plain, once every 2 or 3 years is adequate; in the piedmont and mountains, once every 3 to 4 years will do. An effective strategy is to sample one-half of your land each year if you live in the coastal plain and one-third of your land each year if you live in the piedmont or mountains.

## How to Package Samples

Use a permanent black ink pen to fill out the appropriate information sheet(s) and to label each soil sample box. Do not use pencil. Use the appropriate sample ID from your field map (refer to the section **A Strategy for Collecting Samples**). Boxes are easiest to label before they are folded.

Use the standard soil sample boxes provided by the NCDA&CS Agronomic Division. Do not place soil in plastic bags. Close box flaps securely to prevent spillage during shipment. Loose flaps allow soil to spill from the box and become mixed with other samples. If you take samples from a quarantined area, be sure to seal each box.

Please fill all appropriate blanks on the information sheet(s) and write legibly. Each *Soil Sample Information* sheet can accommodate 12 samples. Be particularly careful to list the crops you intend to grow, along with the crop codes. Homeowners should use codes found under the heading *Lawn, Garden and Ornamentals*. Also, check to make sure that the sample ID on the form corresponds to the one on the soil sample box and on the farm map. Prior to placing samples in the shipping container, make certain that a sample box is present for each line entry on the information sheet.

You can fill out information sheets and submit them on-line from the Division's Web site at [www.ncagr.com/agronomi](http://www.ncagr.com/agronomi). If you do this, be sure to print two copies of your completed information sheet: one to send to the lab with your soil samples and the other for your records.

Place individual sample boxes upright in a sturdy cardboard container for shipping. Stack samples no more than three boxes high. Place a piece of cardboard between each layer to help prevent crushing of the lower boxes. Pack individual sample boxes firmly in the shipping container. Fill empty space with crumpled newspaper. Do not put more than 40 samples in a single shipping container.

Place information sheets inside the shipping container with the samples and keep a copy for your records. It is a good idea to place information sheets inside a sealed plastic bag to keep them clean and legible. However, never use a plastic bag to transport and ship samples.

Seal the shipping container with heavy-duty tape. Write the grower's name on the outside of the container. When sending more than one container, label each one to indicate the total number being sent: for example, "Box 1 of 3," "Box 2 of 3," "Box 3 of 3." When sending problem samples, write "Problem Samples" clearly in large red letters on the outside, top, and sides of the mailing container.