

Soil Testing

There are several nutrients that are essential for plant growth. A soil test is used to determine the amount of these nutrients in the soil. The soil test results are subsequently used to make a soil test report. In addition to indicating the level of nutrients in your soil, the report will also tell you the **pH** value or how acidic or basic your soil is, and it will make a recommendation for the amount and type of fertilizer and/or lime you need to add to the soil for optimum plant growth. This allows you to customize your soil fertilizer and lime applications to your plants' needs.

Following the recommendations will help prevent problems with nutrient deficiencies (in the case of under-fertilization) or problems associated with over-fertilization, such as excessive vegetative growth, delayed maturity, salt burn, and wasted money. In addition, it can protect against environmental pollution resulting from excessive fertilizer applications. Testing the soil is very important because in some parts of the state the soil may already contain high levels of phosphorus or calcium, and may already be in the correct pH range (or higher). In these cases, the indiscriminate addition of lime or a fertilizer containing phosphorus may create nutrient imbalances that reduce plant health.

How to Take Soil Samples

To have a soil analysis done you need to collect 8 to 10 or more core samples, which will be combined as one composite sample. The composite samples should include soil from the surface to a depth of 6 inches in all areas, except for lawns where core samples should be taken from a depth of only 2 to 4 inches. A simple garden trowel can be used to collect the core samples.



Lawn & garden soil samples may be dug by trowel.
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Landscape professionals may use a soil probe to collect soil core samples, which will create little damage to the lawn.



A soil probe is far less destructive to a residential lawn than using a trowel or shovel. The holes are relatively inconspicuous.
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Place the core samples in a clean plastic bucket and mix them thoroughly. Keep sampling separate from

areas that have been fertilized or limed differently, such as lawns, shrub beds, and vegetable gardens. These should be submitted as separate composite samples. It is imperative to use clean sampling tools. Pesticide or fertilizer residues will create misleading results. Additionally, the sample must not be excessively wet before it goes to the lab.



The soil dug by trowel or soil probe are put into a clean plastic bucket. Mix the soil well before transferring a pint of soil to a soil bag.

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Bring a minimum of 2 cups of soil per composite sample in a clean jar or zip-lock bag to your county Extension office. Be sure to keep track of which part of your yard, landscape or garden the sample represents. At the Extension office they will ask you to fill out the information on a soil test bag, fill out a record sheet, and check the appropriate boxes for the analyses desired. The cost of a standard soil test is \$6.00 per sample. Alternatively, a prepaid soil sample mailer kit can be ordered from Clemson Extension's on-line [CU Marketplace](#), or picked up at any [county Extension office](#). This postage prepaid mailer kit costs \$15.00 and can be mailed to the Agricultural Service Lab from home. Each soil test provides unbiased, scientific information on:

- The soil pH value.
- The current soil levels of phosphorus, potassium, calcium, magnesium, zinc, manganese, copper, and boron.
- Fertilizer and lime recommendations (if needed) for the plants you are growing. (Up to 4 categories of plants or turfgrass may be selected with each soil sample.)

How Many Samples to Take

You need to dig and have tested a composite soil sample from each section of your yard or garden.

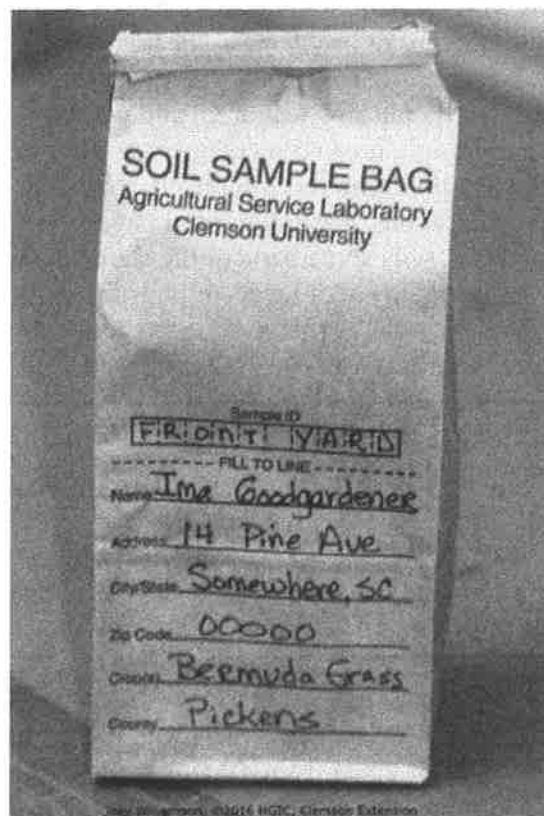
Usually this means, for example, one composite sample in your turf area, one in any foundation or perennial bed, and one in your vegetable garden. If you have a problem area where plants or turfgrass do not seem to grow well, take a separate soil composite sample from that location in addition to the sample from the non-problematic area.



Fill the soil bag. This is approximately a pint of soil.
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Sampling Frequency

The Clemson University Extension Service recommends soil sampling every year.



Label the soil bag with name, address, county and the type of lawn, crop, or landscape plant.

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Time of Sampling

Soil samples can be taken at any time of the year, but it is best to sample the soil a couple months before planting a garden, establishing perennials, or before the optimum time for fertilizing lawns to allow ample time for the lime to react with the soil.

Soil Test Results

Within seven to fourteen days, a copy of your soil analysis will be emailed or mailed directly to you from the Agricultural Service Lab. Your county Extension office will also receive a copy. Your soil analysis will have the soil pH value and a bar graph representing the amount of soil nutrients found. It will have a section at the bottom of the first page which shows how much lime (if needed) to add for each 1000 square feet and refer you to specific comments on the last page. The comments section will tell you what type of fertilizer(s) you need, how much you need and when to apply it. These recommendations are specific for whatever type of plant(s) you want to grow (as you indicated on the soil test record sheet). Ideally, the bars representing the nutrients on the soil report should be at the upper end of "sufficient", and the soil pH in the correct range for the specific plant or crop. Applying the recommended fertilizer and lime should accomplish this and allow for best plant growth. Please see the soil report example at the end of this fact sheet.

Understanding Your Soil Test Report

Soil pH: Soil pH is a measure of how acidic or alkaline your soil is. Soil pH directly affects nutrient availability. The pH scale ranges from 0 to 14, with 7 as neutral. Numbers less than 7 indicate acidity, while numbers greater than 7 indicate an alkaline soil. Plants thrive best in different soil pH ranges. Azaleas, rhododendrons, blueberries, and conifers grow best in acidic soils (pH 5.0 to 5.5). Vegetables, most turfgrasses, and most ornamentals do best in slightly acidic soils (pH 6.0 to 6.5). Centipedegrass grows best in acidic soils (5.5 to 6.0). Soil pH values above or below these ranges may result in less vigorous growth or symptoms of nutrient deficiencies. The soil buffer pH value is used along with the soil pH to calculate the amount of lime required for adjust of the soil pH into the

correct range for optimal plant growth. Typically, lime is applied as pelletized dolomitic limestone, which takes several months to totally dissolve and change the soil pH. However, faster acting limestone is frequently available, but at a much higher price. A disadvantage to this faster acting limestone is that it does not last as long in the soil.

Nutrients: Nutrients for healthy plant growth are divided into three categories: primary, secondary and micronutrients. Nitrogen (N), phosphorus (P) and potassium (K) are primary nutrients, which are needed in fairly large quantities compared to the other nutrients. Calcium (Ca), magnesium (Mg) and sulfur (S) are secondary nutrients which are required by the plant in lesser quantities, but are no less essential for good plant growth than the primary nutrients. Zinc (Zn), manganese (Mn), copper (Cu), and boron (B) are micronutrients which are required by plants in very small amounts. Most secondary and micronutrient deficiencies are easily corrected by keeping the soil at the optimum pH value. Dolomitic limestone not only raises the soil pH of acidic soils, but also is the primary source of both calcium and magnesium.

Nitrogen: Available nitrogen is taken up by plant roots in the form of nitrate (NO_3^-) and ammonium (NH_4^+). Nitrogen testing is not recommended because the levels of available nitrogen are variable due to its mobility in the soil. The available forms of nitrogen are very water soluble and move rapidly through the soil profile with rainfall and irrigation. This causes the amount in the root zone to fluctuate over time. Recommendations are based on the requirements of the particular plants you are growing.

Agricultural Service Laboratory
171 Old Cherry Road, Clemson, SC 29634
Phone: 864-656-2068 Fax: 864-656-2069



Date: 1/16/2016

Lab Number: 15010000

Soil Report for:

Account: 0000000

Ima Goodgardener
 Somewhere, SC 29000

Farm Id: Turfgrass

Sample Id: Front yard

Soil Code: 4

Analysis

Results

Soil pH 6.5
 Buffer pH 7.70

Low Medium Sufficient High Excessive

Element	Value	Unit	Range
Phosphorus (P)	100	lbs/acre	Low to Sufficient
Potassium (K)	160	lbs/acre	Low to Sufficient
Calcium (Ca)	2050	lbs/acre	Low to Sufficient
Magnesium (Mg)	438	lbs/acre	Low to Sufficient
Zinc (Zn)	20	lbs/acre	Low to Sufficient
Manganese (Mn)	51	lbs/acre	Low to Sufficient
Boron (B)	2.0	lbs/acre	Low to Sufficient
Copper (Cu)	1.0	lbs/acre	Low to Sufficient
Sodium (Na)	25	lbs/acre	Low to Sufficient
Sulfur (S)		lbs/acre	
Soluble Salts		mmhos/cm	
Nitrate Nitrogen		ppm	
Organic Matter		% (LOI)	

Calculations

Base Saturation

Cation Exchange Capacity (CEC)	Acidity	Ca	Mg	K	Na	Total
12.0 meq/100g	2.4 meq/100g	67%	14%	2%	0%	83%

Recommendations

Lime

Crop

Bermudagrass (sq ft) *No Lime Required*

Comments: Nutrients on this report are all at the upper end of the sufficient range without being excessive. The soil pH is at the upper end of the ideal range for most turfgrass, crops, and landscape plants (6.0 to 6.5). This soil pH allows for many trace elements that are naturally in the soil to become available for uptake by plants. In this example, lime would not be required, and depending upon the plants, only nitrogen would

need to be applied. Sampling was done early enough to amend the soil with lime, if it was needed.

If you need help interpreting the results of your soil tests, call the Home & Garden Information Center at 1-888-656-9988 between 8:00 am and 4:30 pm, Monday through Friday.