Eco-Meet Study Guide: Soils 2017

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6th, 7th and 8th Grade Performance Standards

Georgia Standards

S6CSLA, S6CSC, S6CSD, S6CS5A, S6CS5B, S6CSB, S6CSC, S6C9A, S6C59D, S6C510C, S6E6B, S6E5G

S7CSIA, S7CS3D, S7CSRA, S7CS5B, S7LB, S7L4A, S7L4C, S7L4D

S8GS3D, S8CS6C, S8CS7D, S8CS9D

South Carolina Standards

6.S.1A, 6.S.1A2, 6.E.2A.3, 6.L.5B, 6, L.5.B, 6.L.5.B.5

7.S.IA, 7.S.IA.2, 7.S.IA.4 7.S.IA.5, 7.S.IA.6, 7.S.IA.8, 7.S.3A.4, 7.EC.5, 7.EC.5A, 7.EC.5A2, 7.EC.5B1,

8.S.IA.1, 8.S.IA.2, 8.S.IA.6, 8.S.IA.8

What is soil?

Soil is the loose material that covers much of the Earth. Plants grow in soil.

The Earth's soil is made of four main materials. The four materials are rocks, humus, air and water. These materials are mixed together.

The rocks in soil are in tiny bits. Like bigger rocks, they are made of minerals. Minerals are solid material that form in nature. Minerals were never alive.

The second material is soil was once alive. It is called humus. When plants and animals die, they break down or decay. The decayed matter is called humus.

The last two materials in soil are air and water. Air and water fill little spaces between the bits of rock and humus in soil.

Soil is a naturally occurring mixture of mineral and organic ingredients with a definite form, structure, and composition. The exact composition of soil changes from one location to another. The following is the average composition by volume of the major soil ingredients:

- 45% Minerals (clay, silt, sand, gravel, stones).
- 25% Water (the amount varies depending upon precipitation and the water-holding capacity of the soil).
- 25% Air (an essential ingredient for living organisms).

- 5% Organic matter or humus (both living and dead organisms).

A soil is composed primarily of minerals which are produced from parent material that is weathered or broken into small pieces. Beyond occasional stones, gravel, and other rock debris, most of the mineral particles are called sand, silt, or clay. These mineral particles give soil texture. Sand particles range in diameter from 2 mm to 0.05 mm, are easily seen with the unaided eye, and feel gritty. [One millimeter (mm) is about the thickness of a dime.] Silt particles are between 0.05 mm and 0.002 mm and feel like flour. Clay particles are smaller than 0.002 mm and cannot be seen with the unaided eye. Clay particles are the most reactive mineral ingredient in the soil. Wet clay usually feels sticky.

Water and air occupy the pore spaces—the area between the mineral particles. In these small spaces, water and air are available for use by plants. These small pore spaces are essential to the life of soil organisms, to soil productivity, and to plant growth.

The final ingredient of a soil is organic matter. It is comprised of dead plant and animal material and the billions of living organisms that inhabit the soil.

Soil is a Natural Resource

A natural resource is something from Earth that people need or use. Soil has minerals that all living things need.

Plants take in water and minerals from the soil through their roots. Animals get the minerals that they need by eating plants. We also get minerals by eating animals that eat plants.

Soil can be lost in different ways. When farmers plow, soil is loosened. After farmers harvest their crops, the soil is bare. Wind and water erode the soil that is loose or bare. Once the soil is lost, the land cannot be used to grow food.

Other ways that we use the land can cause soil erosion. When people dig to make roads and buildings, soil is loosened. Cutting trees for wood makes the land bare. Mining also can leave land bare.

New soil takes hundreds of years to form. That is why people must conserve soil by slowing down erosion.

What is a soil scientist?

A soil scientist studies the upper few meters of the Earth's crust in terms of its physical and chemical properties; distribution, genesis and morphology; and biological components. A soil scientist needs a strong background in the physical and biological sciences and mathematics.

What is soil science?

Soil science is the science dealing with soils as a natural resource on the surface of the Earth including soil formation, classification, and mapping; physical, chemical, biological, and fertility properties of soils; and these properties in relation to the use and management of the soils.

Soils play multiple roles in the quality of life throughout the world. Soils are not only the resource for food production, but they are the support for our structures, the medium for waste disposal, they maintain our playgrounds, distribute and store water and nutrients, and support our environment. They support more life beneath their surface than exists above. They facilitate the life cycle of growth, sustenance and decay. They influence the worldwide distribution of plants, animals, and people.

What does a soil scientist do?

Soil scientists work for federal and state governments, universities, and the private sector. The job of a soil scientist includes collection of soil data, consultation, investigation, evaluation, interpretation, planning or inspection relating to soil science. This career includes many different assignments and involves making recommendations about many resource areas.

A soil scientist needs good observation skills to be able to analyze and determine the characteristics of different types of soils. Soil types are complex and the geographical areas a soil scientist may survey are varied. Aerial photos or various satellite images are often used to research the areas. Computer skills and geographic information systems help the scientist to analyze the multiple facets of geomorphology, topography, vegetation, and climate to discover the patterns left on the landscape.

Soil scientists work in both the office and field. The work may require walking over rough and uneven land and using shovels and spades to gather samples or examine a soil pit exposure.

Soil scientists work in a variety of activities that apply soil science knowledge. This work is often done with non-soil science professionals. A soil scientist's job may involve:

- conducting general and detailed soil surveys
- determining the hydric (wetness) characteristics of the soil
- recommending soil management programs
- helping to design hydrologic plans in suburban areas
- monitoring the effects of farm, ranch, or forest activities on soil productivity
- giving technical advice used to help plan land management programs
- predicting the effect of land management options on natural resources
- preparing reports describing land and soil characteristics
- advising land managers of capabilities and limitations of soils (e.g., timber sales, watershed rehabilitation projects, transportation planning, soil productivity, military maneuvers, recreation development)
- training other personnel
- preparing technical papers and attending professional soil science meetings
- conducting research in public and private research institutions
- managing soils for crop production, forest products and erosion control management.
- evaluating nutrient and water availability to crops
- managing soils for landscape design, mine reclamation, and site restoration
- investigating forest soils, wetlands, environmental endangerment, ecological status, and archeological sites
- assessing application of wastes including non-hazardous process wastes (residue and sludge management)
- conducting studies on soil stability, moisture retention or drainage, sustainability, and environmental impact
- assessing environmental hazards, including hazardous waste sites that involve soil investigation techniques, evaluation of chemical fate and transport phenomena, and remediation alternatives
- regulating the use of land and soil resources by private and public interests (government agencies)

These are some of the activities which soil scientists regularly practice. This work is most often conducted in coordination with other professionals with lesser training and knowledge of soil systems.

Well-trained soil scientists are in high demand for a wide array of professional positions with public agencies or private firms. Here are some specific examples of positions currently held by soil science graduates from one just university over the past 10 years.

- Wetland specialist
- Watershed technician
- Hydrologist with Board of Health
- Environmental technician
- State soil and water quality specialist
- Soil Conservationist
- County Agricultural Agent
- Landscaping business
- Farming
- On-site evaluation
- Crop consultant
- Soil scientist, mapping and interpretation, U.S. Department of Agriculture
- Research technician
- Conservation planner
- District marketing manager for an agricultural firm
- County conservationist
- Crop production specialist
- Research scientist

What kind of people become soil scientists?

People that become soil scientists usually have one or more of the following characteristics:

- love of science
- enjoy working outdoors
- enthusiasm for maps and relationships in nature
- desire to be an integral in environmental decisions related to soil conservation, land use, water quality, or waste management
- willingness to communicate their knowledge about soils and the environment to all aspects of society
- hunger for answers to questions and solutions to problems in agricultural and environmental settings
- desire to contribute to the success of others

How do people become soil scientists?

Most soil scientists have earned at least a bachelor degree from a major agricultural university. At many universities, two choices are available for specialized training in soils. The Soil Science option prepares students to enter the agricultural sector as farm advisors, crop consultants, soil and water conservationists, or as representatives of agricultural companies. The Environmental Soil Science option prepares soil scientists for careers in environmental positions dealing with water quality concerns, remediation of contaminants or for on-site evaluation of soil properties in construction, waste disposal, or recreational facilities.

How does soil form?

Soils develop as a result of the interactions of climate, living organisms, and landscape position as they influence parent material decomposition over time. Differences in climate, parent material, landscape position, and living organisms from one location to another as well as the amount of time the material has been in place all influence the soil-forming process.

Soil Formation's super acronym……..CLORPT

Soils differ from one part of the world to another, even from one part of a backyard to another. They differ because of where and how they formed.

There are more organisms in one shovel full of soil that all of the people living on planet Earth

Five major factors interact to create different types of soils:

CLimate, **O**rganisms, **R**elief, **P**arent material and **T**ime

Climate—Temperature and moisture influence the speed of chemical reactions, which in turn help control how fast rocks weather and dead organisms decompose. Soils develop faster in warm, moist climates and slower in cold or arid ones.

Organisms—Plants root, animals burrow, and bacteria eat – these and other organisms speed up the breakdown of large soil particles into smaller ones. For instance, roots produce carbon dioxide that mixes with water and forms an acid that wears away rock.

Relief (landscape)—The shape of the land and the direction it faces make a difference in how much sunlight the soils gets and how much water it keeps. Deeper soils form at the bottom of a hill because gravity and water move soil particles down the slope.

Parent material—Every soil "inherits" traits from the parent material from which it formed. For example, soils that form from limestone are rich in calcium and soils that form from materials at the bottom of lakes are high in clay. Every soil formed from parent material deposited at the Earth's surface. The material could have been bedrock that weathered in place or smaller materials carried by flooding rivers, moving glaciers, or blowing winds. Parent material is changed through biological, chemical and environmental processes, such as weathering and erosion.

Time—All of these factors work together over time. Older soils differ from younger soils because they have had longer to develop. As soil ages, it starts to look different from its parent material. That is because soil is dynamic. Its components—minerals, water, air, organic matter, and organisms—constantly change. Components are added and lost. Some move from place to place within the soil. And some components are totally changed, or transformed.

Soil Profile/Horizon

Soil Profile

There are different types of soil, each with its own set of characteristics. Dig down deep into any soil, and you'll see that it is made of layers, or horizons (O, A, E, B, C, R). Put the horizons together, and they form a soil profile. Like a biography, each profile tells a story about the life of a soil. Most soils have three major horizons

(A, B, C) and some have an organic horizon (O).

The horizons are:

O – (humus or organic) Mostly organic matter such as decomposing leaves. The O horizon is thin in some soils, thick in others, and not present at all in others.

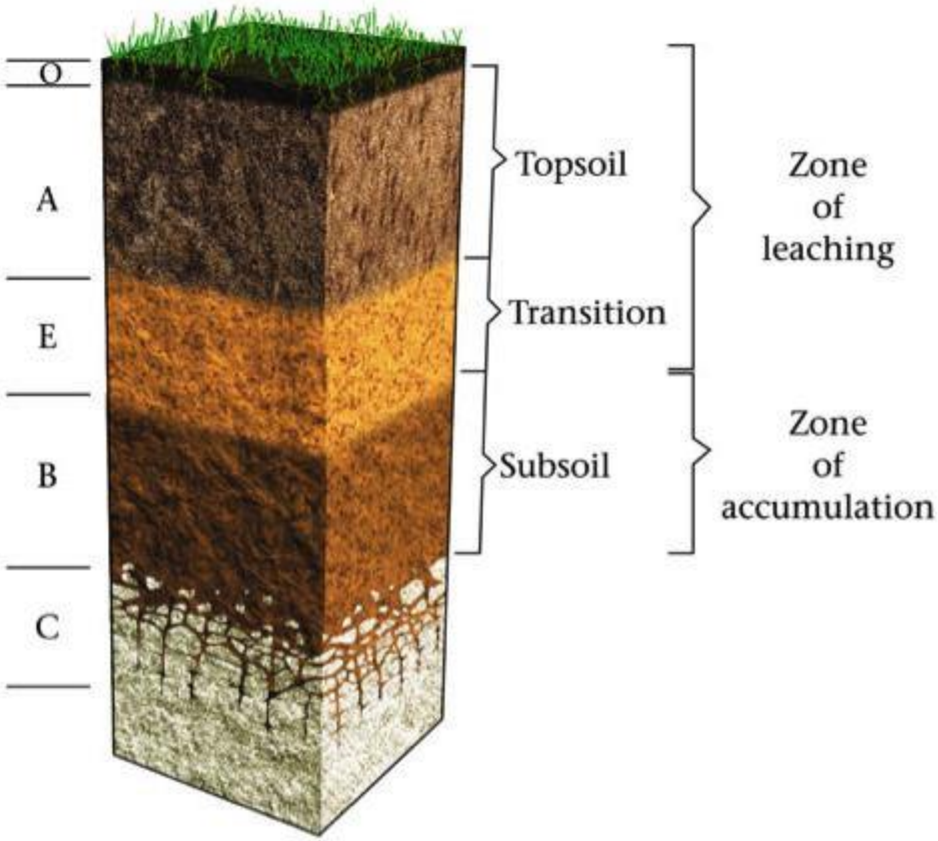
A - (topsoil) Mostly minerals from parent material with organic matter incorporated. A good material for plants and other organisms to live.

E – (eluviated) Leached of clay, minerals, and organic matter, leaving a concentration of sand and silt particles of quartz or other resistant materials – missing in some soils but often found in older soils and forest soils.

B – (subsoil) Rich in minerals that leached (moved down) from the A or E horizons and accumulated here.

C – (parent material) The deposit at Earth's surface from which the soil developed.

R – (bedrock) A mass of rock such as granite, basalt, quartzite, limestone or sandstone that forms the parent material for some soils – if the bedrock is close enough to the surface to weather. This is not soil and is located under the C horizon.

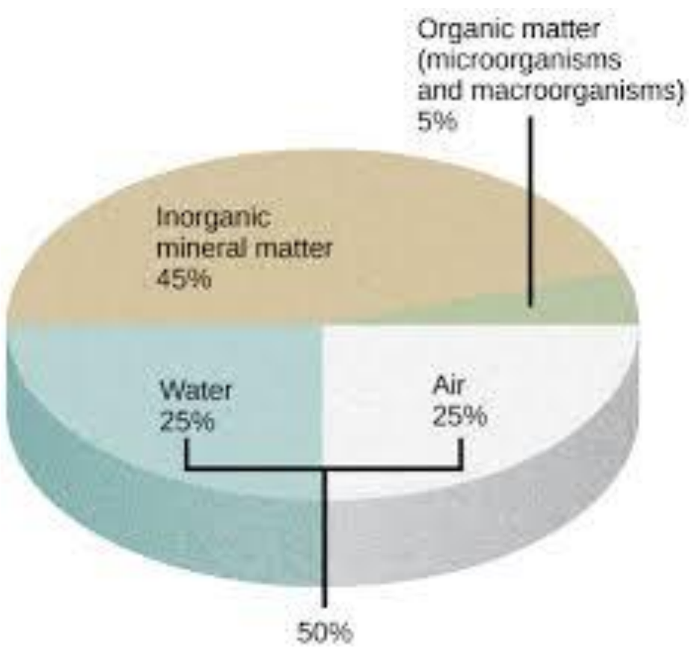


O
A
E
B
C
Topsoil
Transition
Subsoil
Zone of leaching
Zone of accumulation

What is Soil?

There are many soil properties that help us describe and manage soils. Some of the important physical properties are described below.

Ideal soil will have a composition of air, water, mineral matter and organic material or humus. The strived for ratio is shown below



Inorganic Mineral Matter

The nonliving particles that make up soil are categorized into three groups by size – sand, silt, and clay. Sand particles are the largest and clay particles the smallest. Most soils are a combination of the three. The relative percentages of sand, silt, and clay are what give soil its texture. A clay loam texture soil, for example, has nearly equal parts of sand, slit, and clay.

Sand – 2.0 to 0.05 mm

Silt – 0.05 to 0.002 mm

Clay – less than 0.002 mm

Sandy topsoil has mostly large grains. Sandy soil packs together when it is wet, but crumbles as it dries out. Water drain through sandy soils quickly. Sandy soils are usually dry.

Silty topsoil has medium sized grains and feels soft and velvety. It holds water well. That means water stays in or on top of the silt instead of draining through.

Clay topsoil has very tiny grains that clump together. There is very little space between the grains, so water does not drain well through clay. Clay soil feels sticky when wet.

Loam is a mixture of sand, silt and clay but also has lots of organic matter.

Air and Water

Soil aeration influences the availability of many nutrients. Particularly, soil air is needed by many of the microorganisms that release plant nutrients to the soil. An appropriate balance between soil air and soil water must be maintained since soil air is displaced by soil water.

Air can fill soil pores as water drains or is removed from a soil pore by evaporation or root absorption. The network of pores within the soil aerates, or ventilates, the soil. This aeration network becomes blocked when water enters soil pores. Not only are both soil air and soil water very dynamic parts of soil, but both are often inversely related:

An increase in soil water content often causes a reduction in soil aeration.

Likewise, reducing soil water content may mean an increase in soil aeration.

Since plant roots require water and oxygen (from the air in pore spaces), maintaining the balance between root and aeration and soil water availability is a critical aspect of managing crop plants.

Soil air is very different than the above-ground atmosphere. A significant difference is between the levels of carbon dioxide. Since the soil contains high amounts of carbon dioxide, oxygen levels may become limited. Since plants must have oxygen to live, it is important to allow proper aeration in the soil.

A proper balance between soil water and soil air is critical since both water and air are required by most processes that release nutrients into the soil. Soil water is particularly important in nutrient management. In addition to sustaining all life on Earth, soil water provides a pool of dissolved nutrients that are readily available for plant uptake. Therefore, it is important to maintain proper levels of soil moisture.

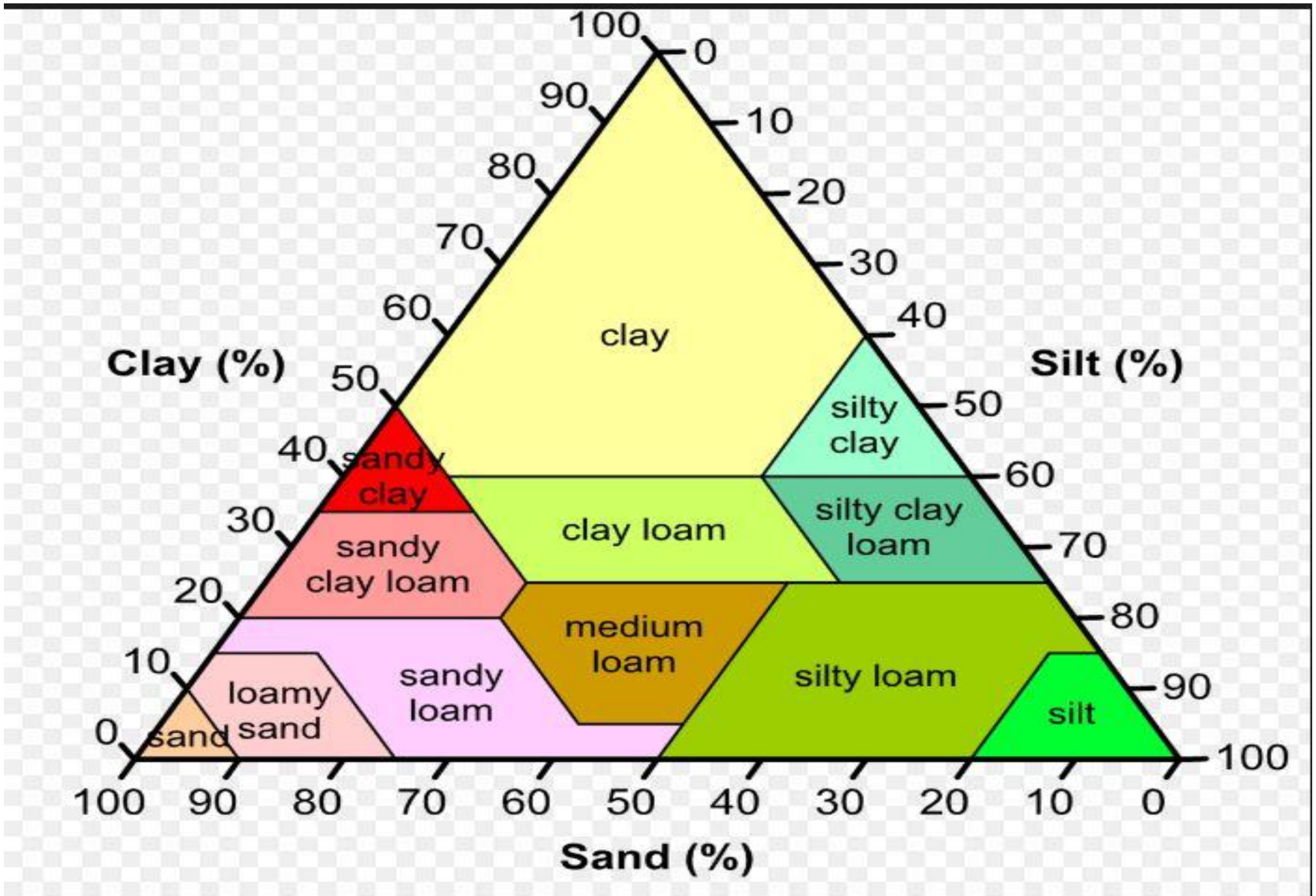
Soil water is the medium from which all plant nutrients are assimilated by plants. Soil water, sometimes referred to as the soil solution, contains dissolved organic and inorganic substances and transports dissolved nutrients, such as nitrogen, phosphorus, potassium, and calcium, to the plant roots for absorption.

Organic Materials and Living Organisms

Plants affect soil development by supplying upper layers with organic matter, recycling nutrients from lower to upper layers, and helping to prevent erosion. In general, deep rooted plants contribute more to soil development than shallow rooted ones because the passages they create allow greater water movement, which in turn aids in leaching. Leaves, twigs, and bark from large plants fall onto the soil and are broken down by fungi, bacteria, insects, earthworms, and burrowing animals. These organisms eat and break down organic matter releasing plant nutrients. Some change certain elements, such as sulfur and nitrogen, into usable forms for plants. Microscopic organisms and the humus they produce also act as a kind of glue to hold soil particles together in aggregates. Well-aggregated soil is ideal for providing the right combination of air and water to plant roots.

Soil Triangle

There are 12 soil textural classes represented on the soil texture triangle below. This triangle is used so that terms like "clay" or "loam" always have the same meaning. Each texture corresponds to specific percentages of sand, silt, or clay. Knowing the texture helps us manage the soil.



Soil Structure

Soil structure is the arrangement of soil particles into small clumps, called peds or aggregates. Soil particles (sand, silt, clay and even organic matter) bind together to form peds. Depending on the composition and on the conditions in which the peds formed (getting wet and drying out, or freezing and thawing, foot traffic, farming, etc.), the ped has a specific shape. They could be granular (like gardening soil), blocky, columnar, platy, massive (like modeling clay) or single-grained (like beach sand). Structure correlates to the pore space in the soil which influences root growth and air and water movement.

There are different categories of elements that make up fertilizers and they are called "major, secondary, or micronutrients." There are also three major nutrients plant must have which are nitrogen, phosphorus, and potassium.

Nitrogen is the element that is most used by a plant and basically promotes growth. Soil samples do not reveal Nitrogen levels in them because that element moves rapidly through the soil as well as the plants. These levels can change daily. Grass is greenest and grows fastest when there is plenty of Nitrogen available. Phosphorus is involved in the process of transferring energy throughout the plant which is important in root development and flowering. This second major nutrient will be listed on a soil sample result with a recommendation of a how much, if any, might need to be added to the soil. The same thing applies for these soil sample recommendations to our third major element which is Potassium. Potassium helps the inside of the plant regulate itself correctly which is critical for dealing with stress and fighting disease.

On the front of any bag of fertilizer, you will see 3 numbers which represent the three major elements needed for the plants. The first is Nitrogen, then Phosphorus and finally Potassium. A soil sample may recommend a fertilizer for early season grass "green up." The recommended blend might be labeled 16-4-8. That means 16% of the bag is Nitrogen, 4% is Phosphorus and 8% is Potassium. Different blends are used for different levels of seasonal growth, as well as different varieties of plants. For intense grass, 16-4-8 is a good blend to help your warm season lawn come out of dormancy and jump back into the warming growth season. This application is usually recommended in mid-April. Once the grass is nice and green, and the mower is running regularly, a different blend of fertilizer would be recommended to help with steady growth and darker green coloring. At that point, apply something like 22-0-5 in June. When the seasons move toward fall, fertilizer blends tend to drop the percentage of Nitrogen and focus more on Phosphorus and Potassium. The reason being is we don't want a large surge in growth with impending cold weather, possibly hurting new and more tender growth put on by a Nitrogen boost.

There are also 2nd level elements plants need to supplement nutrition which include Calcium, Magnesium and Sulfur. These help with a plant's structure, growth and development. Two of these 2nd tier nutrients, Calcium and Magnesium, are easily supplemented with the dolomitic lime. Sulfur may need to be added separately unless it happens to be blended into a fertilizer mix.

The next levels of nutrients plants need are called micronutrients. They are traces of elements like Boron, Chlorine, Copper, Iron, Manganese, Molybdenum, and Zinc.

Soil pH: What it Means

Soil pH is an indication of the acidity or alkalinity of soil and is measured in pH units. The pH scale goes from 0 to 14 with pH 7 as the neutral point. As the amount of hydrogen ions in the soil increases, the soil pH decreases thus becoming more acidic. From pH 7 to 0 the soil is increasingly more acidic and from pH 7 to 14 the soil is increasingly more alkaline or basic.

Descriptive terms commonly associated with certain ranges in soil pH are:

- Extremely acid: < than 4.5; lemon=2.5; vinegar=3.0; stomach acid=2.0; soda=2–4
- Very strongly acid: 4.5–5.0; tomatoes=4.5
- Strongly acid: 5.1–5.5; carrots=5.0; asparagus=5.5; cabbage=5.3

- Moderately acid: 5.6–6.0; potatoes=5.6
- Slightly acid: 6.1–6.5; salmon=6.2; cow's milk=6.5
- Neutral: 6.6–7.3; saliva=6.6–7.3; blood=7.3; shrimp=7.0
- Slightly alkaline: 7.4–7.8; eggs=7.6–7.8
- Moderately alkaline: 7.9–8.4; sea water=8.2
- Strongly alkaline: 8.5–9.0; borax=9.0
- Very strongly alkaline: > than 9.1; milk of magnesia=10.5, ammonia=11.1; lime=12

Measuring Soil pH

Soil pH provides various clues about soil properties and is easily determined. The most accurate method of determining soil pH is simple and easy. Take a soil sample. There may be considerable variation in the soil pH from one spot in a field or lawn to another. To determine the average soil pH of a field or lawn it is necessary to collect soil from multiple locations and combine into one sample.

The effect of soil pH is great on the solubility of minerals or nutrients. Fourteen of the seventeen essential plant nutrients are obtained from the soil. Before a nutrient can be used by plants it must be dissolved in the soil solution. Most minerals and nutrients are more soluble or available in acid soils than in neutral or slightly alkaline soils.

Phosphorus is never readily soluble in the soil but is most available in soil with a pH range centered around 6.5. Extremely and strongly acid soils (pH 4.0-5.0) can have high concentrations of soluble aluminum, iron and manganese which may be toxic to the growth of some plants. A pH range of approximately 6 to 7 promotes the most ready availability of plant nutrients.

But some plants, such as azaleas, rhododendrons, blueberries, white potatoes and conifer trees, tolerate strong acid soils and grow well. Also, some plants do well only in slightly acid to moderately alkaline soils. The soil pH can also influence plant growth by its effect on activity of beneficial microorganisms. Bacteria that decompose soil organic matter are hindered in strong acid soils. This prevents organic matter from breaking down, resulting in an accumulation of organic matter ties up nutrients, particularly nitrogen.

Lime is usually added to acid soils to increase soil pH. The addition of lime not only replaces hydrogen ions and raises soil pH, thereby eliminating most major problems associated with acid soils but it also provides two nutrients, calcium and magnesium to the soil. Lime also makes phosphorus that is added to the soil more available for plant growth and increases the availability of nitrogen by hastening the decomposition of organic matter. Liming materials are relatively inexpensive, comparatively mild to handle and leave no objectionable residues in the soil.

Some common liming materials are: (1) Calcic limestone which is ground limestone; (2) Dolomitic limestone from ground limestone high in magnesium; and (3) Miscellaneous sources such as wood ashes. The amount of lime to apply to correct a soil acidity problem is affected by a number of factors, including soil pH, texture (amount of sand, silt and clay), structure, and amount of organic matter. In addition to soil variables the crops or plants to be grown influence the amount of lime needed.

How to Take a Soil Sample

Steps in Soil Sampling

Recommendations about when and how to apply nutrients are only as good as the soil sample submitted for analysis.

To obtain a representative soil sample, the following steps are useful: identify sampling locations (zones), determine the sampling depths, use the right sampling tools, sample at the right time, and handle the samples accordingly.

1. Sampling Locations

Map out the area where the plants are to be grown or are presently growing. This will help in record keeping and ensure that the soil is taken from throughout the entire area.

Divide the area such that each soil sample represents one plant type or condition. An area that has been divided according to obvious differences in plant types, plant performance, soil types, and drainage is shown in Figure 1.

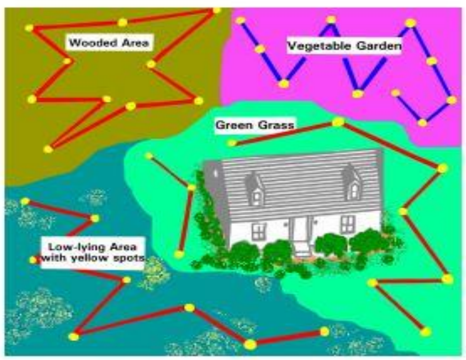


Figure 1. Area divided according to vegetation and soil characteristics. Yellow dots indicate sampling points.

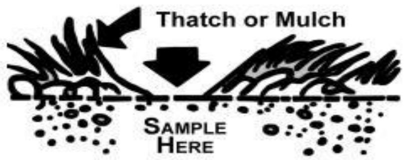


Figure 2. Remove grass thatch or mulch before sampling.

- Use a zigzag approach when taking samples. Collect 8-10 soil samples from each location (zone) as shown in Figure 1.
- For trees and shrubs, take soil samples from six to eight spots around the drip-line of the plants.

2. Sampling Depth

The depth of sampling depends on the type of plants being grown.

- For lawns, sample to a depth of 4 inches.
- For gardens, ornamentals, mixed fruit trees and wildlife plots, sample to a depth of 6 inches.

3. Sampling Time

Soil sampling should be done well in advance of planting or spring green-up. This allows adequate time for sample analysis, data interpretation, and fertilizer and lime application.

4. Sampling Tools

Use clean sampling tools and containers to avoid contaminating the soil sample. Never use tools or containers that have been used for fertilizer or lime. Collect samples with tools like trowels, shovels, spades, hand probes or hand augers.

Figure 3. Soil sampling with a trowel.

5. Sampling Procedures

Clear the ground surface of grass thatch or mulch (Figure 2). Using a trowel, push the tool to the desired depth into the soil. Push the handle forward, with the spade still in the soil to make a wide opening. Then, as shown in Figure 3, cut a thin slice from the side of the opening that is of uniform thickness, approximately 1/4-inch thick and 2 inches in width, extending from the top of the ground to the depth of the cut. Collect from several locations. Combine and mix them in a plastic bucket to avoid metal contamination. Take about a pint of the mixed soil and place it the UGA soil sample bag. Be sure to identify the sample clearly on the bag and the submission form before mailing.

Sample Handling

Samples should be air dried overnight. Dry samples on a flat surface lined with clean white paper. Take care to avoid contamination. After drying, transfer the sample to the soil sample bag and bring it to your local extension office. Your extension office will send samples to:

The Soil, Plant and Water Lab
University of Georgia
2400 College Station Road
Athens, GA 30602-9105

THE UNIVERSITY OF GEORGIA
COOPERATIVE EXTENSION
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

Soil, Plant, and Water Laboratory
2400 College Station Road
Athens, Georgia 30602-9105
Website: http://aesl.ces.uga.edu

Soil Test Report

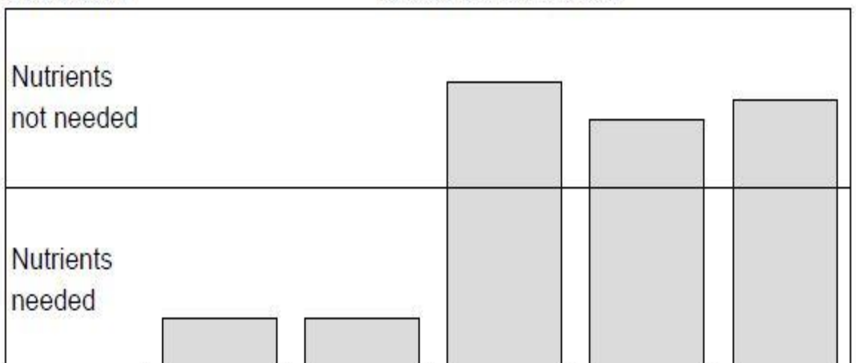
(CEC/CEA Signature)

Sample ID

Client Information		***Lab Information***	***County Information***
COUNTY PROGRAM	uge3245@uga.edu 706-821-2350	Lab #17123	**Richmond County**
602 GREENE ST		Completed: Nov 29, 2016	602 Greene Street
Augusta, GA 30901		Printed: Jan 5, 2017	Augusta, GA 30901
Sample: Walton Plaza		Tests: S1	phone: 706-821-2350
Crop: Ornamental Trees			e-mail: uge3245@uga.edu

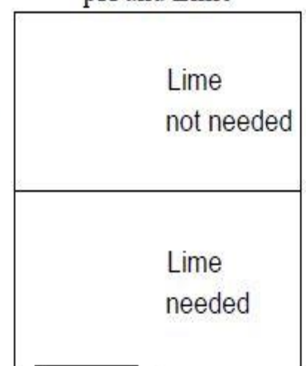
Results

Mehlich I Extractant



No phosphate (P), potash (K), or lime needed if shaded bars are above this line:

pH and Lime



	Phosphorus (P)	**Potassium (K)**	**Calcium (Ca)**	**Magnesium (Mg)**	**Zinc (Zn)**
Soil Test Index	29 lbs/Acre	84 lbs/Acre	1268 lbs/Acre	129 lbs/Acre	21 lbs/Acre

pH	
4.8	**Soil Test Index**