Tifton
Georgia State Soil

Soil Science Society of America

Introduction

Many states have a designated state bird, flower, fish, tree, rock, etc. And, many states also have a state soil – one that has significance or is important to the state. The Tifton soil is the official state soil of Georgia. Let's explore how the Tifton soil is important to Georgia.

History

The Tifton series was named for the city of Tifton, located in Tift County. While the series was first identified in Tift County, the Grady County survey was published first. Therefore, the Tifton series was officially established by the publication of the Grady County soil survey in 1909. This survey was conducted by Hugh Hammond Bennett, the first Chief of the Soil Conservation Service. The current type location for the Tifton soil series is Tift County, Georgia.

Although not officially designated by the state legislature as the state soil, the Tifton soil series was selected by the Georgia Soil Classifiers Association as the representative soil for Georgia. This selection was made for the 1999 Centennial Celebration of the National Cooperative Soil Survey.

What is Tifton Soil?

Formed in loamy coastal plain marine sediments, Tifton soils are very deep and well drained. The Tifton series is different from most other coastal plain soils because of the presence of higher concentrations of *ironstone* nodules. Ironstone is a cemented iron rich nodule. Tifton soils are also characterized by the presence of *plinthite* (**Figure 1**), which is the start of ironstone.

Fig. 1. Broken face of a plinthite nodule.
Credit: John Kelley, USDA-NRCS, retired.

Every soil can be separated into three separate size fractions called *sand, silt,* and *clay*, which makes up the *soil texture*. They are present in all soils in different proportions and say a lot about the character of the soil. Tifton soils generally have sand or loamy sand surface *horizon* textures underlain by *sandy loam* or *sandy clay loam subsoil* texture (**Figure 2**). Ironstone nodules usually occur in the surface horizons and upper subsoil, and plinthite generally occurs in the lower subsoil.

Photo Soil Monolith: Chip Clark/Smithsonian Institution

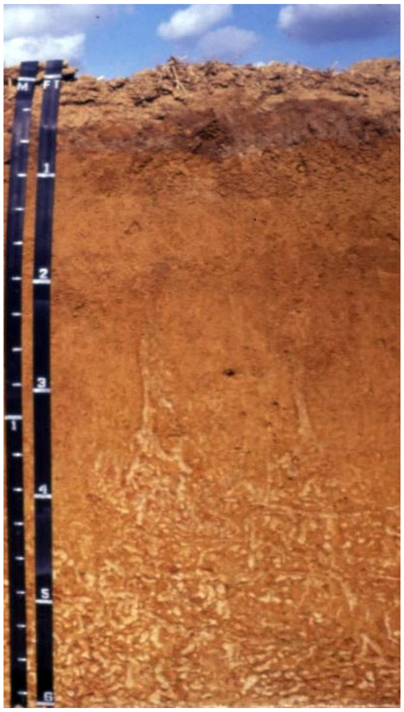

Fig. 2 Profile of the Tifton soil series. Left tape in meters, right tape in feet.Credit: USDA-NRCS.

Fig. 3. Location of the Tifton soil series in Georgia, Florida, and Alabama. Credit: Smithsonian Institution's Forces of change. http://forces.si.edu\soils\interacftive\statesoils\index.html

Where to dig Tifton

Yes, you can dig a soil. It is called a soil pit, and it shows you the soil profile. The different horizontal layers of the soil are called soil horizons. The Tifton soil series is found in Georgia, Florida, and Alabama **(Figure 3)**. Tifton soils occur on broad ridges and sideslopes of the coastal plain. The general topography is gently rolling. Tifton covers more than 2 million acres of land in 65 coun¬ties of Georgia. Most of these acres occur in the Southeastern Plains ecoregion (see ecoregions section), which is the largest ecoregion in the state. Tifton soils occur in the Southern Coastal Plain ecoregion to a lesser extent. In all, there are over 300 named soils (series) in **Georgia**.

Importance

What makes the Tifton soil so important is its use and prevalence in the State. Although suitable for a variety of land uses, Tifton soils are some of the most important agricultural soils in Georgia (**Figure 4**). In fact, it is the most extensively mapped prime farmland soil in the state. Prime farmland is described as those soils with the best physical and chemical characteristics for sustained food and fiber production under proper *soil management*. Because it is a well-drained soil and has loamy textures, it is conducive for plant growth. The typical landscape position lends itself well to the use of agricultural equipment. Also, the type of *clay*, *kaolinite*, is a low-activity clay that does not swell and shrink very much as the subsoil gets wet and then dries. Therefore, house foundations and roads built on Tifton soils are not likely to be damaged by shrinking and swelling of the soil.

Uses

In general, soils can be used for agriculture (growing foods, raising animals, stables); engineering (roads, buildings, tunnels); ecology (wildlife habitat, wetlands), recreation (ball fields, playground, camp areas) and more. Most Tifton soil in Georgia supports agriculture, either as crop, pasture, or forest land. Much of the Tifton area is planted in cotton, peanuts, and soybeans **(Figure 5)**. Winter vegetable crops, such as collards and kale are also common **(Figure 6)**.

Land Use category	Acres	Percent
Cultivated crops	1,050,405	50.7
Evergreen forest	281,153	13.6
Pasture/hay	175,933	8.5
Developed,open space	130,226	6.3
Grassland/herbaceous	98,812	4.8

Fig. 4. Top five land use categories across Tifton soils in Georgia (USGS, 2011). More than half of the mapped acreage is cultivated cropland.

Common forestry plantings have traditionally been slash pine *(Pinus elliottii)*, but in recent years, longleaf pine *(Pinus palustris)* planting has increased. The longleaf pine-wiregrass *(Pinus palustris-Aristida* sp.) ecosystem was dominant in the coastal plain prior to European settlement and has been reduced to about three percent of its original extent across the entire Southeastern U.S. This ecosystem is home to threatened and endangered plant and animal species, and restoration efforts are ongoing.

Limitations

When a soil cannot be used for one or more of the described functions, it is referred to as a limitation. Soil experts, called *Soil Scientists*, studied Tifton soil and identified that it has few limitations. Tifton is well suited for most agriculture, forestry, and recreation uses. Some soils may be limited by the presence of a high *water table* during some time of the year. Tifton, however, is considered well drained because a water table would occur below a depth of 100 cm (40 inches).

Fig. 5 Strip till peanuts on Tifton soil. Much of the Tifton soils in Georgia are planted in crops. Credit: Mary Leidner, USDA-NRCS.

Fig. 6. Collards are a winter vegetable crop grown on Tifton soil. *Ironstone* nodules are evident between crop rows. Credit: Scott Moore, USDA-NRCS.

Management

The Tifton soil has few management issues. Because it is a well-drained soil and has loamy textures, it is well suited for a variety of land uses. Tifton soils are strongly to very strongly acidic (pH range 4.5-5.5) and may require the addition of lime and fertilizer to improve soil fertility for crop production.

Tifton Formation

Before there was soil there were marine sediments and in between, ClORPT. Without ClORPT, there will be no soil. So, what is ClORPT? It is the five major factors that are responsible for forming a soil like the Tifton series. It stands for **C**limate, **O**rganisms, **R**elief, **P**arent material and **T**ime. ClORPT is responsible for the development of soil profiles and chemical properties that differentiate soils. So, the characteristics of Tifton (and all other soils) are determined by the influence of ClORPT. Weathering takes place when environmental processes such as rainfall, freezing and thawing act on rocks causing them to dissolve or fracture and break into pieces. ClORPT then acts on rock pieces, marine sediments and vegetative materials to form soils.

Climate – Temperature and precipitation influence the rate at which parent materials weather and dead plants and animals decompose. They affect the chemical, physical and biological relationships in the soil. The climate where the Tifton soil series occurs is warm and humid. The mean annual temperature is about 18 degrees Celsius (64 degrees F), and mean annual precipitation is about 1360 mm (53 inches).

Organisms – This refers to plants and animal life. In the soil, plant roots spread, animals burrow in, and bacteria break down plant and animal tissue. These and other soil organisms speed up the breakdown of large soil particles into smaller ones. Plants and animals also influence the formation and differentiation of *soil horizons*. Plants determine the kinds and amounts of *organic matter* that are added to a soil under normal conditions. Animals break down complex compounds into small ones and in so doing add *organic matter* to soil.

Relief – Landform position or relief describes the shape of the land (hills and valleys), and the direction it faces which makes a difference in how much sunlight the soil gets and how much water it keeps. Deeper soils form at the bottom of the hill rather than at the top because gravity and water move soil particles downhill. Tifton is generally located on the broad, more convex portions of the landscape (**Figure 7**).

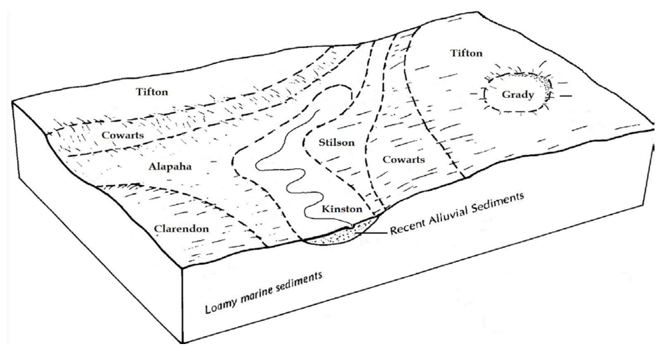

Fig 7. Block diagram of the Tifton soil landscape. Credit: USDA-NRCS

Parent material (C horizon) – Just like people inherit characteristics from their parents, every soil inherits some traits from the material from which it forms. Some parent materials are transported and deposited by glaciers, wind, water, or gravity. The Tifton soil series was formed in loamy marine deposits. The dominant clay type is kaolinite, and dominant sand type is quartz.

Time – All the factors act together over a very long period of time to produce soils. As a result, soils vary in age. The length of time that soil material has been exposed to the soil-forming processes makes older soils different from younger soils. Generally, older soils have better defined horizons than younger soils. Less time is needed for a soil profile to develop in a humid and warm area with dense vegetative cover than in a cold dry area with sparse plant cover. More time is required for the formation of a well-defined soil profile in soils with fine textured material than in soils with coarse-textured soil material. The horizons of the Tifton soil are fairly well developed, and the presence of ironstone concretions indicates a long period of soil development. Throughout geologic time, the coastal plain has experienced repeated ocean transgressive events, and as a result of the erosional and depositional events, the region has a ‘benched’ appearance. The most recent uplift and sea level changes occurred during the Quaternary period (~2.5 million years ago to present).

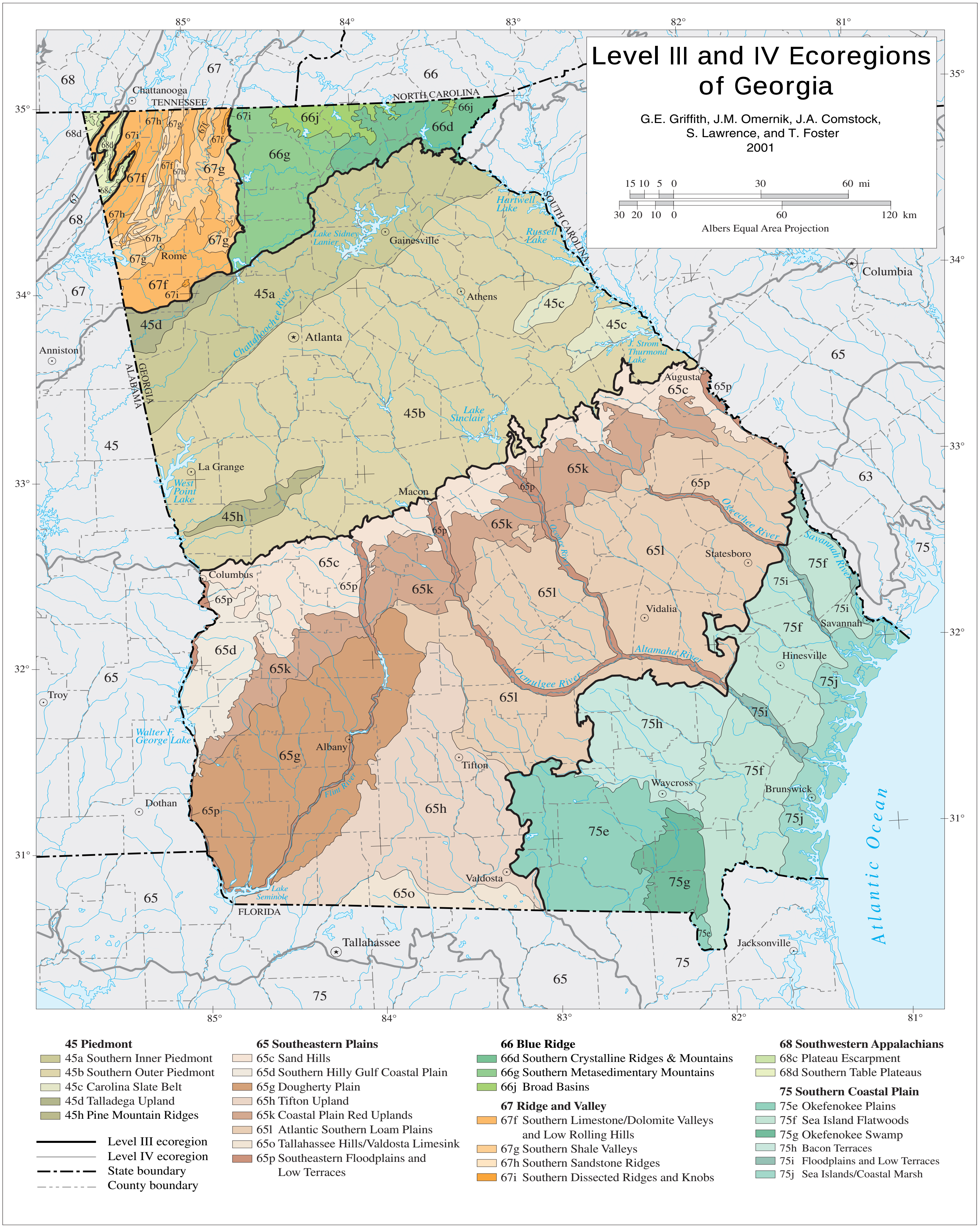

Fig. 8 Ecoregions of Georgia–Credit:US-EPA. http://ecologicalregions.info/data/co/co_front.pdf

Ecoregions, Soils and Land Use in Georgia

Georgia is divided into six basic *ecoregions* **(Figure 8)** which are further subdivided. Tifton soils are confined to the Southeastern Plains ecoregion (65) and to the Southern Coastal Plain ecoregion (75) to a lesser extent.

In the Southeastern Pains ecoregion, Tifton occurs predominantly in the Tifton Upland (65l), Atlantic Southern Loam Plains (65h), Dougherty Plain (65g), and Tallahassee Hills/Valdosta Limesink (65o) subdivisions. These areas are characterized by the southern mixed forest and planted pine plantations, but most areas are in crop land. Major row crops are corn, peanuts, soybeans, and cotton with specialty crops including pecans, blueberries, cabbage, and tobacco. The Atlantic Southern Loam Plains (65l) has another name in Georgia – the Vidalia Upland. Sweet Vidalia onions are a special crop grown in this part of the state.

In the Southern Coastal Plain ecoregion, Tifton is mapped mostly in the Bacon Terraces (75h) subdivision. This area is characterized by flat plains on dissected marine terraces and supports a variety of agriculture. Important crops include corn, cotton, soybeans, tobacco, and blueberries. Pine plantations are important for the forestry industry, and forested wetlands are important for water quality and wildlife habitat.

Glossary

Clay: A soil particle that is less than 0.002 mm in diameter. Clay particles are so fine they have more surface area for reaction. They hold a lot of nutrients and water in the soil. A clay soil is a soil that has more than 40% clay, less than 45% sand and less than 40% silt.

Ecoregion: Represents areas with similar biotic and abiotic characteristics which determine the resource potential and likely responses to natural and man-made disturbances. Characteristics such as climate, topography, geology, soils, and natural vegetation define an ecoregion. They determine the type of land cover that can exist and influence the range of land use practices that are possible.

Horizon: see Soil horizons

Ironstone: Irreversibly hardened plinthite.

Kaolinite: A nonexpanding clay mineral resistant to further weathering.

Loamy sand: Soil material that is a mixture of between 70-90% sand, up to 30% silt, and less than15% clay. It has more sand than sandy loam.

Organic matter: Material derived from the decay of plants and animals. Always contains compounds of carbon and hydrogen.

Plinthite: Iron-rich, humus-poor mixture of clay with quartz and other minerals commonly occurring as dark red concentrations and formed by repeated wetting and drying cycles in the soil. Plinthite is the precursor of ironstone.

Sand (particle size): A soil particle between 0.05 and 2.0 mm in diameter. Sand is also used to describe soil texture according to the soil textural triangle, for example, loamy sand.

Sand (texture): Soil material that contains 85-100% sand, 0-15% silt, and 0-10% clay. It has more sand than loamy sand.

Sandy clay loam: Soil material that contains 45-80% sand, 0-27% silt, and 20-35% clay. It has more clay than sandy loam.

Sandy loam: Soil material that contains between 43-85% sand, 0-50% silt and 0-20% clay. It has less sand than loamy sand.

Silt: A soil particle between 0.002 and 0.05 mm diameter. It is also used to describe a soil textural class.

Soil horizon: A layer of soil with properties that differ from the layers above or below it.

Soil management: The sum total of how we prepare and nurture soil, select type of crops that suitable for a type of soil, tend the crop and the soil together, and determine fertilizer types and other materials to be added to soil to maintain productivity and preserve soil.

Soil profile: The sequence of natural layers, or horizons, in a soil. It extends from the surface downward to unconsolidated material. Most soils have three major horizons, called the surface horizon, the subsoil, and the substratum.

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.

Soil texture: The relative proportion of sand, slit, and clay particles that make up a soil. Sand particles are the largest and clay particles the smallest. Learn more about soil texture at www.soils4teachers.org/physical-properties

Subsoil: (B horizon) The soil horizon rich in minerals that eluviated, or leached down, from the horizons above it. Not present in all soils.

Topography: The shape of the land surface. (Relief: refers to differences in elevation of different points in a region.)

Water table: The top layer of ground water where the soil is filled with standing water. It can move up or down during different seasons.

Additional Resources

Soil! Get the Inside Scoop. David Lindbo and others. Soil Science Society of America, Madison, WI.

Know Soil, Know Life. David L. Lindbo, Deb A. Kozlowski, and Clay Robinson, editors. Soil Science Society of America, Madison, WI.

Web Resources

Soils for Teachers—www.soils4teachers.org

Soils for Kids—http://www.soils4kids.org/

Have Questions? Ask a Soil Scientist—https://www.soils.org/ask

Soil Science Society of America—https://www.soils.org/

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