LYNCHBURG
South Carolina 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 Lynchburg soil is the official state soil of South Carolina. Let's explore how the Lynchburg soil is important to South Carolina.

History

Lynchburg soil is the South Carolina State soil. Lynchburg soils were established in 1947. The Lynchburg soil was selected as South Carolina's state soil back in 1991 by the South Carolina Professional Soil Classifiers. The soil profile used in the Smithsonian exhibit "Dig It! The Secret of Soil" was taken in Colleton County South Carolina near the town of Walterboro.

What is Lynchburg Soil?

Lynchburg soils are very deep, somewhat poorly drained soils that formed in sandy and loamy marine sediments. They are found on marine terraces and flats in the Atlantic Coastal Plain and Flatwoods in South Carolina. Landscapes for the Lynchburg soil ranges from shallow depressions to broad inter-stream divides in the Coastal Plain. Slopes ranges from 0 to 5 percent across this map unit.

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. In Lynchburg soils the surface horizon is dark brown sandy loam. In the upper subsoil the soil is brownish yellow sandy clay loam with gray iron depletions and strong brown masses of oxidized iron. In the lower subsoil the soil is gray sandy clay loam with strong brown masses of oxidized iron **(Figure 1)**.

Fig. 1. Lynchburg soil profile. Credit: Smithsonian Institution's Forces of change.

Photo Soil Monolith: Chip Clark/Smithsonian Institution

Fig. 2. Distribution of Lynchburg soil in the state of South Carolina. Credit: Smithsonian Institution's Forces of Change.

Fig. 3 Cultivated crop field on Lynchburg soils. Credit USDA-NRCS

Where to dig a Lynchburg

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. This does not mean that other types of soil cannot be found there but that the Lynchburg soil is the most common. Lynchburg soil covers approximately 432,000 acres of land in 19 counties of South Carolina. In all, there are a total of 283 named soils (series) in South Carolina. You can find Lynchburg soil on marine terraces and flats in the Atlantic Coastal Plain and Flatwoods in South Carolina **(Figure 2)**.

Importance

What makes the Lynchburg soil so important is its use and prevalence in the State. Lynchburg soils are well suited to cultivated crops, pasture, hayland, and woodland. Most of the acreage of Lynchburg soils in South Carolina is now woodland. Lynchburg soils play an important role in wetland ecosystems. Lynchburg soils act as a riparian buffer between uplands and wetlands and function as the primary filters for sediment and contaminants.

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. Lynchburg soils support forest of oak, blackgum, and slash pine. These forest are home to a huge variety of wildlife including the South Carolina state animal, the white-tailed deer, and the South Carolina state game bird, the wild turkey. When used for agricultural production farmers are able to grow corn, soybeans, cotton, tobacco, and wheat **(Figure 3)**. Other uses for the Lynchburg soil are timber production, grazing and hay production for cattle, and recreational uses such as hiking, biking, horseback riding, and atv/motocross trails.

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 Lynchburg soil and identified that it has moderate to severe limitation based on what you are wanting to do. Lynchburg soils have a seasonal high water table that can be found from 6 inches to 18 inches below the surface during wet seasons. Special consideration needs to be taken when planting for crops due to this water table. Lynchburg soils are rated as severe for septic systems due to the presence of a water table. The water table is too high in Lynchburg soils to be able to acquire a permit for a conventional onsite wastewater system in South Carolina. Building a house with a basement is rated as severe due the high water table. Special considerations for drainage need to be considered as part of the plan when moving forward with building a house with a basement.

Management

Lynchburg soils have a seasonal high water table that can be found from 6 inches to 18 inches below the surface during wet seasons. For cropland in South Carolina, Lynchburg soils are classified as farmland of statewide importance; when drainage practices are used they are classified as Prime Farmland. This soil is well suited to corn, soybeans, small grains, and grasses for hay. The major management problem as mentioned above is the seasonal high water table. Drainage is needed for consistently high yields when planting crops. Open ditches, tile drains, or a combination of both of these can be used to drain the soil. The presence of this water table needs to be taken into consideration when planning for everything from cropland, recreational uses, or urban development.

Lynchburg soils are well suited to trees also. Tree saplings do well if competing vegetation is controlled. Due to wetness issues harvesting during the dry season or when dry is recommended to avoid rutting.

Lynchburg soils are poorly suited to most engineering practices due to the presence of the season high water table. Installing tile drains, open ditches or a combination of both can reduce your wetness limitation by lowering the water table.

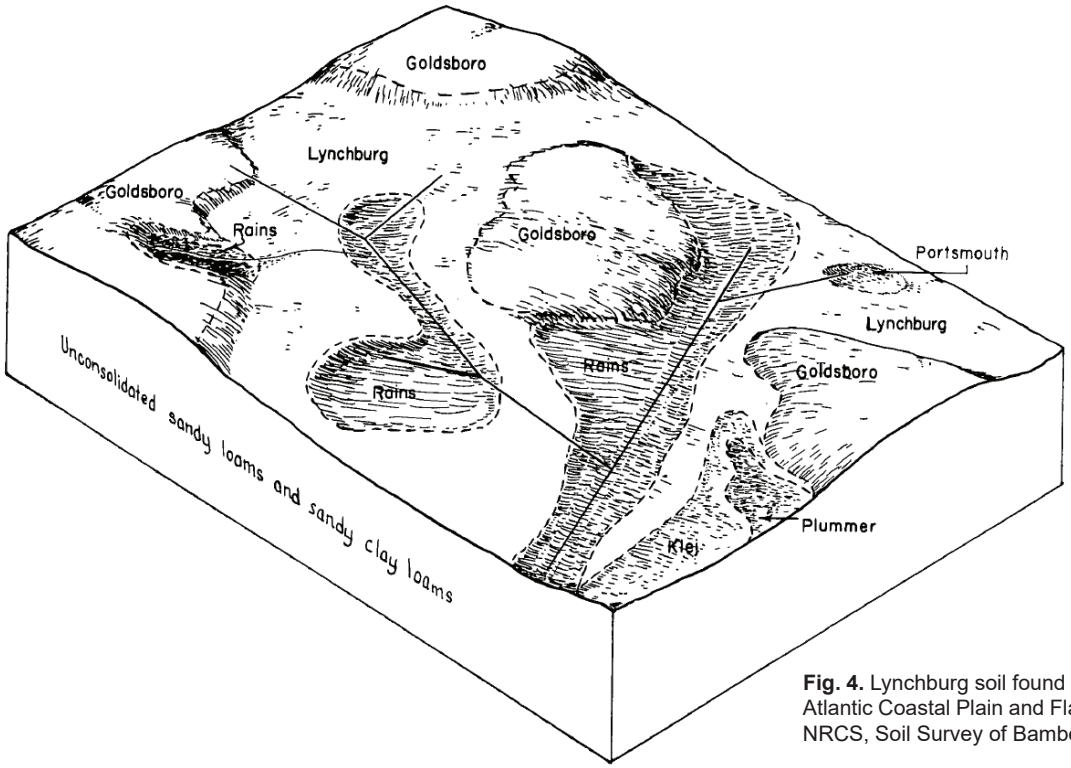

Fig. 4. Lynchburg soil found on marine terraces and flats in the Atlantic Coastal Plain and Flatwoods in South Carolina. USDA-NRCS, Soil Survey of Bamberg County, 1966.

Lynchburg Formation

Before there was soil there were rocks 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 Downer series. It stands for CLimate, Organisms, Relief, Parent material and Time. CLORPT is responsible for the development of soil profiles and chemical properties that differentiate soils. So, the characteristics of Lynchburg soil (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. Around the Lynchburg soil area the mean annual precipitation ranges from 38 to 50 inches. The mean annual temperature ranges from 59 to 66 degrees Fahrenheit.

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 breakdown complex compounds into small ones and in so doing add organic matter to soil. The Lynchburg soil developed under a mixed forest ecosystem; however, the warm and humid climate has caused most of the organic matter from these trees to degrade to levels typically less than 1 to 3% in the surface 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. Lynchburg soils are found on marine terraces and flats in the Atlantic Coastal Plain and Flatwoods in South Carolina. They are found in the transition areas between wetland an upland which explains why Lynchburg soils have the high water table issues **(Figure 4).**

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. Lynchburg soils formed in sandy and loamy marine sediments.

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 Lynchburg series is classified as a untisol. Ultisols are soils in humid areas. They formed from fairly intense weathering and leaching processes. Ultisols are typically acidic and most nutrients are concentrated in the upper few inches. Lynchburg soils have a moderately low capacity to retain additions of lime and fertilizer. The Lynchburg soil developed in a humid and warm climate with fairly dense vegetation over a relatively long time, so they are considered to be highly developed and very old. This weathering causes the minerals in the soil to be less reactive, which is one of the reasons they do not hold nutrients very well.

Lynchburg soils in South Carolina fall primarily within two Ecoregions: The Atlantic Southern Loam Plains and Carolina Flatwoods **(Figure 5)**.

The Atlantic Southern Loam Plains (651) ecoregion is lower, flatter, more gently rolling, with finer-textured soils than 65c. It is a major agricultural zone, with deep, well-drained soils, and more cropland than 65c or 63h. The flora is varied due to the variety of soil conditions. The region has the highest concentration of Carolina bays. These are shallow, elliptical depressions, often swampy or wet in the middle with dry sandy rims. Carolina bays not drained for agriculture often contain rare or endangered plant and animal species.

The nearly level coastal plain of the Carolina Flatwoods (63h) has less relief, wider upland surfaces, and larger areas of poorly drained soils than the adjacent, higher elevation Ecoregion 65l. Covered by shallow coastal waters during the Pleistocene, the resulting terraces and shoreline-related landforms are covered typically by fine-loamy and coarse-loamy soils, with periodically high water tables. Other areas have clayey, sandy, or organic soils, contributing to the region's plant diversity. Carolina bays and pocosin a (type of wetland) are abundant in some areas. The region is a significant center of endemic biota (flora and fauna that are native or restricted to an area) with more biological diversity and rare species compared to 63e. Pine flatwoods, pine savannas, freshwater marshes, pond pine woodlands, and some sandhill communities were once common. Loblolly pine plantations are now widespread with an active forest industry. Artificial drainage for forestry and agriculture is common. North Carolina's blueberry industry is concentrated on some of the sandy, acidic soils of the region.

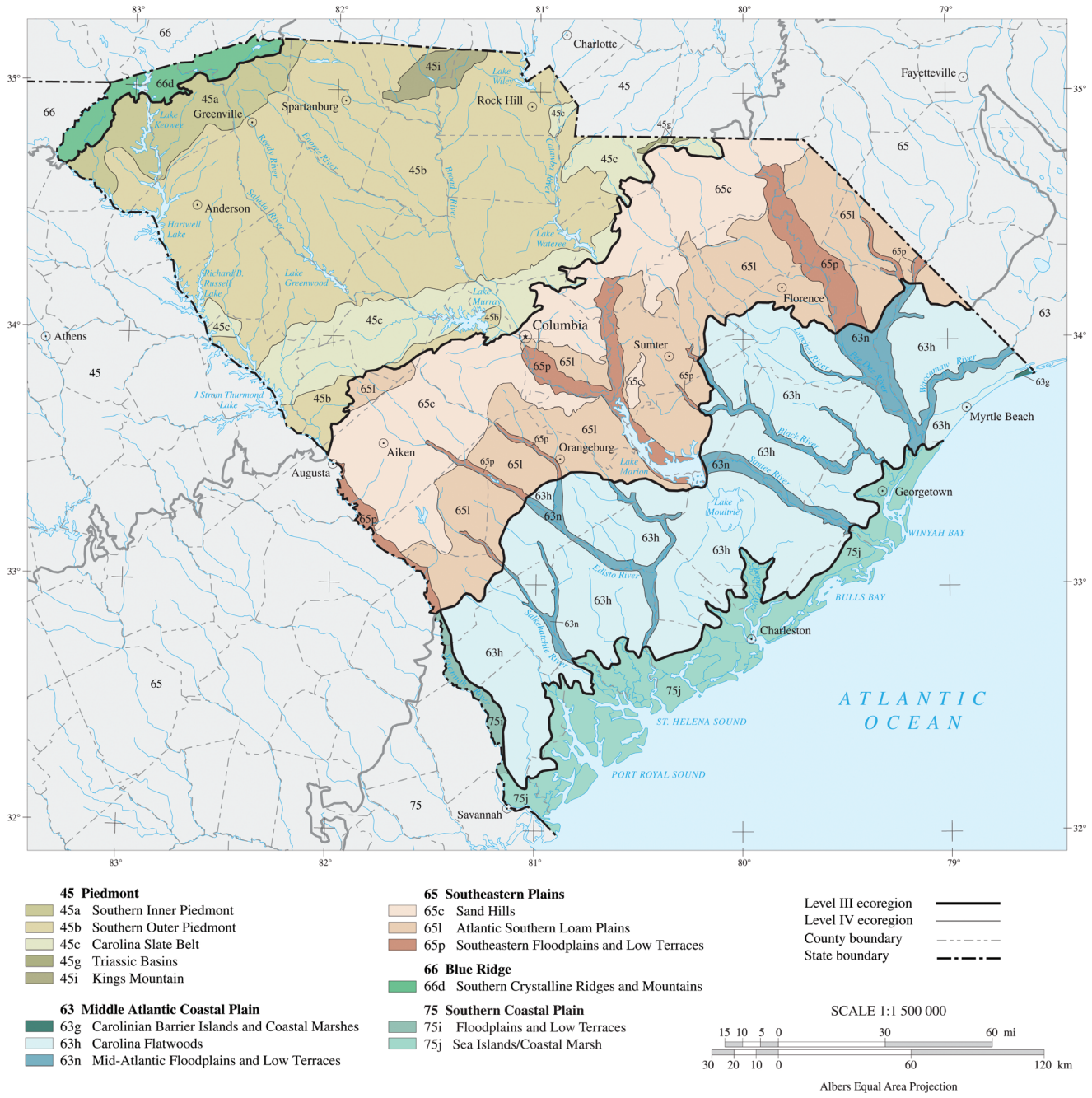

Fig. 5. The ecoregions of South Carolina. Credit: ftp://ftp.epa.gov/wed/ecoregions/sc/sc_eco.pdf

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

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

Riparian buffer: A vegetated area (a "buffer strip") near a stream, usually forested, which helps shade and partially protect the stream from the impact of adjacent land uses and helps stabilize stream banks.

Sand: 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.

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 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

Ultisols: Soils that have formed in humid areas and are intensely weathered. They typically contain a subsoil horizon that has an appreciable amount of translocated clay, and are relatively acidic. Most nutrients are held in the upper centimeters and these soils generally have low fertility although they can become productive with additions of fertilizer and lime. They make up about 8% of the glacier-free land surface.

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.

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This state soil booklet was developed under the auspices of the Soil Science Society of America's K-12 Committee—their dedication to developing outreach materials for the K-12 audience makes this material possible.

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.

Soil Survey of Calhoun County South Carolina, Issue date 1982

Soil Survey of Bamberg South Carolina, issued 1966

https://en.wikipedia.org/wiki/Riparian_buffer

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/

Lynchburg–South Carolina Soil—https://extension.illinois.edu/soil/st_soils/sc_soil.htm

Lynchburg Soils—https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_048237.pdf

The Ecoregions of South Carolina—ftp://ftp.epa.gov/wed/ecoregions/sc/sc_eco.pdf

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