

HAZLETON

Pennsylvania 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 Hazleton is the official state soil of Pennsylvania. Let's explore how the Hazleton is important to Pennsylvania.

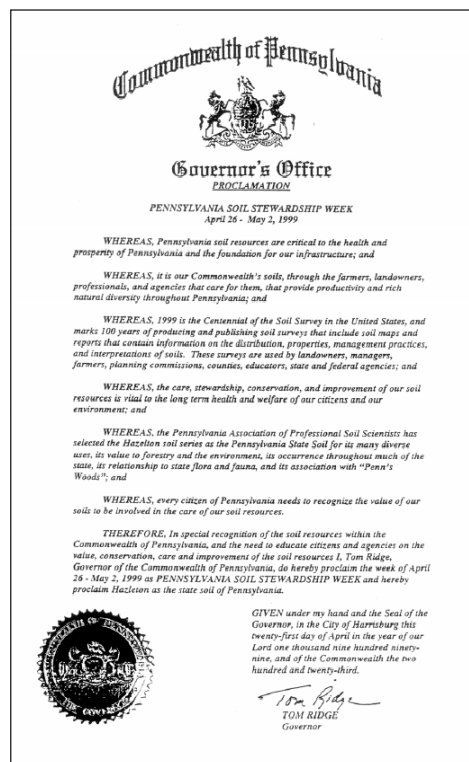
History

The selection of Hazleton as the official state soil began in 1995 when the Pennsylvania Association of Professional Soil Scientists (PAPSS) and the Pennsylvania Natural Resources Conservation Service (NRCS) collaborated on efforts to prepare for the National Soil Survey Centennial Celebration in 1999. Pennsylvania's Soil Survey Centennial was celebrated in 2000 based on the first soil survey published in 1900 for "The Lancaster Area". In order to increase awareness of our most important natural resource, many states developed plans to designate state soils as part of the centennial celebration.

The criteria for selecting a state soil included: The soil series must be named for a Pennsylvania location. The Hazleton was one of several other Pennsylvania soils considered including Berks, Gilpin and Penn soils. However, Hazleton was more extensive in total acreage (approximately 1.5 million acres) and in located in more counties (34 of the 67) mapped across the state. Hazleton was first characterized on the sandstone ridges and sideslopes near the city of Hazleton, Pennsylvania. Based on the selection criteria and review by the membership of the Pennsylvania Association of Professional Soil Scientists, the Hazleton soil series was recommended as the state soil for Pennsylvania in 1998. On April 21, 1999, Governor Tom Ridge signed a proclamation designating Hazleton as the state soil during Pennsylvania Soil Stewardship Week (Figure 1). The Hazleton soil has been promoted as the proclaimed state soil at the Farm Show, Ag Progress Days and other functions ever since this time.

Fig. 1. Hazleton Proclamation.
Credit:Commonwealth of Pennsylvania.

Photo Soil Monolith: Chip Clark/
Smithsonian Institution



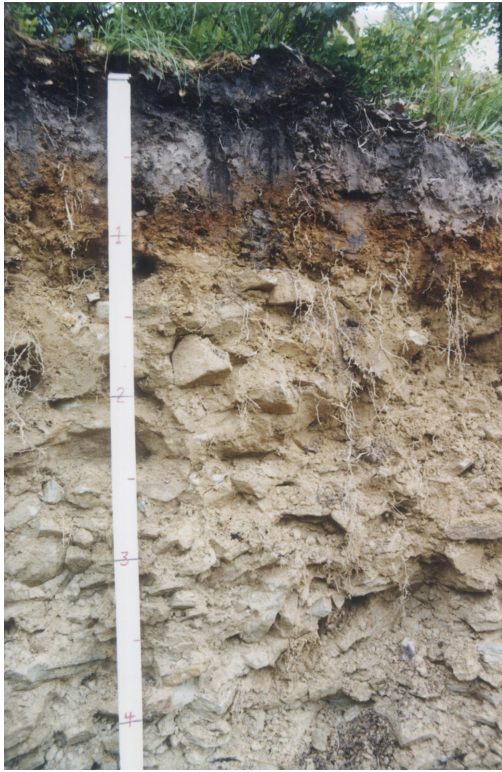


Fig 2. Hazleton soil profile. Credit: Pennsylvania Association of State Soil Scientists.

What is Hazleton Soil?

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. The Hazleton series consists of deep and very deep, well drained soils formed in residuum (in place) of acid gray, brown or red sandstone on uplands. The permeability of the soil is moderately rapid to rapid – meaning that water drains quickly through the soil. Hazleton is a *sandy loam* soil and very stony. The Hazleton soil profile (**Figure 2**) consists of the surface layer (A horizon or *topsoil*) of a dark brown stony, sandy loam. The subsurface layer is a dark gray stony sandy loam. The upper subsoil is a dark reddish brown *channery* sandy loam (*channery* describes a rock shape that is flat and elongated) while the lower subsoil is a yellowish brown channery sandy loam. The next layer is made up of a light yellowish brown very stony sandy loam – which is the start of soil being formed by the breakdown of rock into soil. Finally, the residuum (or bedrock) is a gray sandstone.

Where to dig Hazleton

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 Hazleton is the most common. Hazleton was first mapped on the sandstone ridges and sideslopes near the city of Hazleton Pennsylvania. Hazleton covers approximately 1.5 million acres in 34 of the 37 counties of Pennsylvania (**Figure 3**).

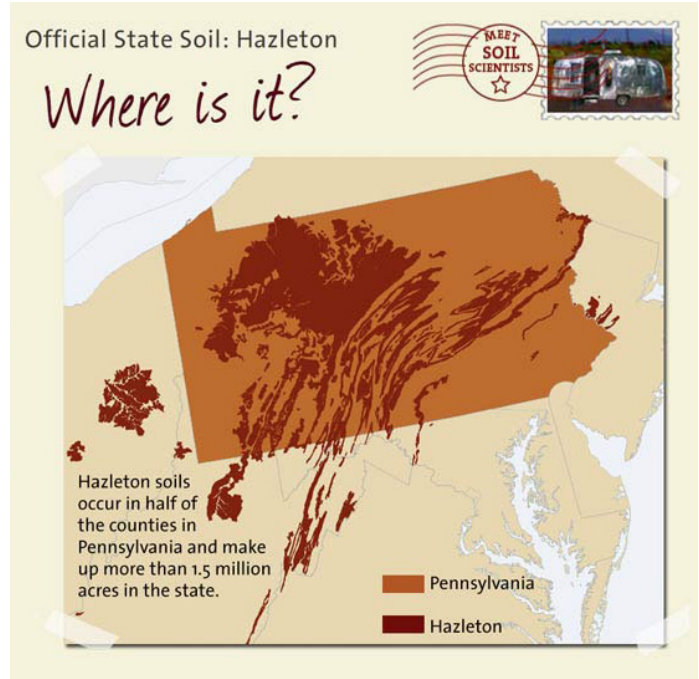


Fig. 3: Location of Hazleton soils in Pennsylvania. Credit: Smithsonian Institution.

Importance

What makes the Hazleton soil so important is its use and prevalence in the State. Hazleton soils represent the diversity of Pennsylvania, being used for forestry, agriculture, mining and infrastructure support.

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. Pennsylvania's state flower is the Mountain Laurel, the state tree is the Eastern Hemlock, the state bird is the Ruffed Grouse, and the state animal is the Whitetail Deer (**Figure 4**) – all of which thrive on Hazleton soil locations. In addition, the world renowned state of black cherry timber (and other specialty hardwood trees) are growing in Hazleton soils located in the Allegheny National Forest in northwestern Pennsylvania.



Fig 4. State tree, flower, bird, and animal. Credit: Pennsylvania Association of Professional Soil Scientists.

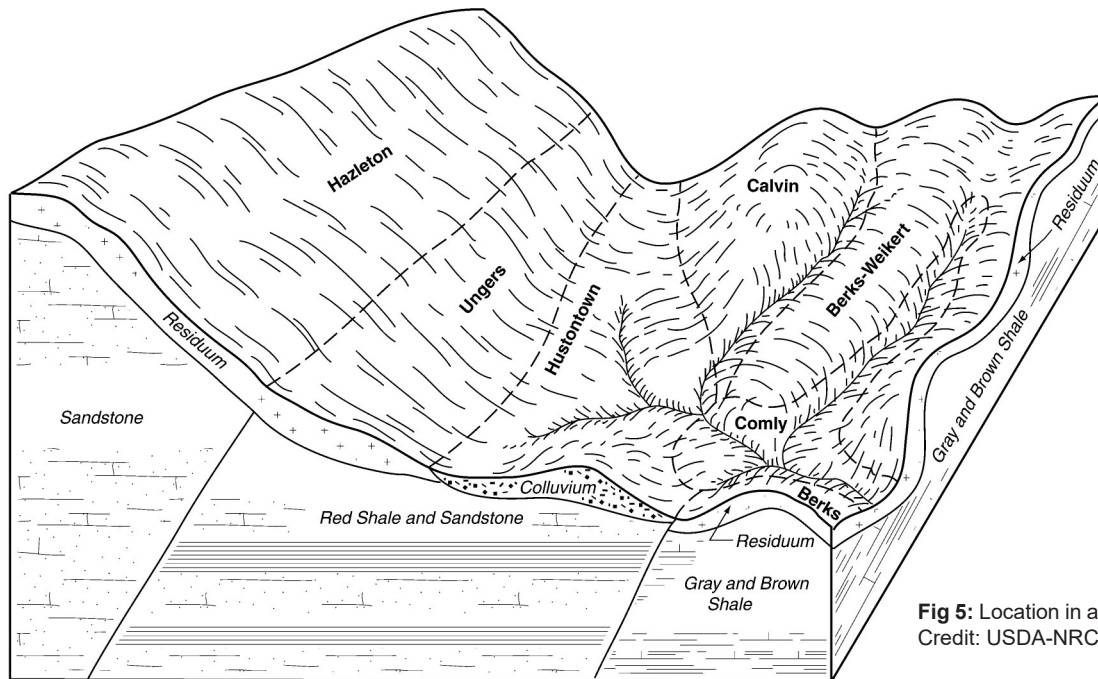


Fig 5: Location in a relief profile of Hazleton soil.
Credit: USDA-NRCS

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 Hazleton soil and identified that most limitations are caused by rocks throughout the soil. In addition, runoff is light to high depending on the grade and vegetation. The erosion hazard is slight to moderate in cultivated areas. Most limitations are caused by slope.

Hazleton 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 Hazleton. 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 Hazleton (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 mean annual precipitation in the location of the Hazleton soil is about 48 inches and the mean annual air temperature is about 51 degrees F. The average frost free season is 110 to 180 days.

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 nor-

mal conditions. Animals breakdown complex compounds into small ones and in so doing add organic matter to soil. Hazleton soil contains partially decayed forest litter with many roots.

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. Hazleton soils are found on summits, shoulders, and the upper third of backslopes (**Figure 5**). Slopes are usually convex with gradients of 0 to 80 percent.

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. Parent material for Hazleton is bedrock.

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. Hazleton soils are considered to be mature.

Glossary

Channery: Unattached pieces of rock 2 mm in diameter or larger that are strongly cemented or more resistant to rupture. Thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. **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

Loamy sand: Soil material that is a mixture of between 70-90% sand, up to 30% silt, and less than 15% 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.

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, silt, 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.

Topsoil: (A horizon) The horizon that formed at the land surface. Mostly weathered minerals from parent material with a little organic matter added.

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/>

References

Pennsylvania Association of Professional Soil Scientists. www.papss.org

USDA-NRCS: https://soilseries.sc.egov.usda.gov/OSD_Docs/H/HAZLE-TON.html

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