A Guide to SOILS

The Soil Neighborhood (Pre-3rd) was written to educate youth about the importance of soil. This guide provides fun facts, useful definitions, and additional resources for teachers to utilize in their classrooms.

SOIL ≠ DIRT

These two words are often mistakenly used interchangeably. However, soil and dirt are not the same. Dirt is what is found under your fingernails, while soil is a valuable earth material. Dirt is considered to be unwanted, while soil provides an environment for organisms to live and for plants to grow. Be sure not to give soil a "dirty" name by calling it dirt!

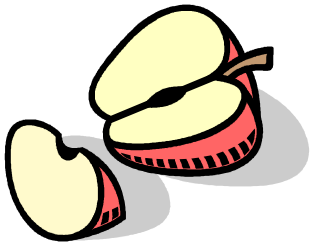
Slice of Soil

Our food producing land remains the same and yet the world population continues to grow. Consequently, each person's food portion becomes smaller and smaller. It is the responsibility of each generation to use the soil wisely.

You can conduct the following demonstration to show how little of the earth's surface is actually used for food production as compared to growing populations.

Materials:

Large apple (softer apples work better)
Paring knife (or heavy plastic knife)



Procedures:

1. Cut the apple into four equal parts. Three parts represent the oceans of the world. The fourth part represents the land area.

2. Cut the land section in half lengthwise. Now you have two 1/8th pieces. One section represents land such as deserts, swamps, Antarctic, arctic, and mountain regions. The other 1/8th section represents land where man can live and may be able to grow food.

3. Slice this 1/8th section crosswise into four equal parts. Three of these 1/32nd sections represent the areas of the world which are too rocky, too wet, too hot, or where soils are too poor for production, as well as areas developed by man.

4. Carefully peel the last 1/32nd section. This small bit of peeling represents the soil of our earth on which mankind depends for food production!

Alphabet soup – *Acronyms for common terms in soil science*

- USDA – United States Department of Agriculture
- NRCS – Natural Resources Conservation Service
- N-P-K – the chemical symbols for Nitrogen (N), Phosphorus (P), and Potassium (K), three important nutrients found in soil that are vital for plant growth

All soil is brown, right? Nope! The color of soil is affected by the minerals present in that soil. Soils come in all different shades of **blacks**, reds, yellows, whites, browns, and grays. For example:

The Red River between Oklahoma and Texas carries red sediments from soil.

The Yellow River in China was given its name because the soil gives the water a yellowish tint.

Desert soils in Idaho, Utah, and Nevada are gray.

Desert soils in California and Arizona are red.

Sands in New Mexico are white.

Just as Kansas has a state bird, flower, amphibian, and more, Kansas also has a state soil! The Harney soil series was adopted as Kansas' official state soil in 1990. Soils are typically named after their location. Named soils are called a *soil series.* Harney soils are an ideal prairie soil and found on about 4 million acres in central-western Kansas. The red area on the map to the right shows where Harney soils are located in Kansas.

- USDA NRCS

Check out http://soils.usda.gov/gallery/state_soils/ to view photos of each state's soil. Observe the different colors of soil while browsing the different types!

According to the National Cooperative Soil Survey, there are over 20,000 different kinds of soil in the United States alone! There are more than 300 different soil types just in Kansas!

What does soil have to do with the Leaning Tower of Pisa in Italy?

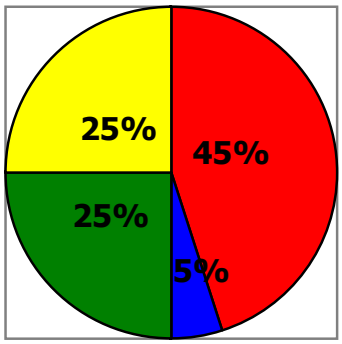
When construction on the tower began in 1173, architects failed to take the type of soil into consideration. The ground there is not good for such a heavy and tall building. The underlying soil is sand and clay. As the weight of the building compressed the layers of soil, the tower sank in some places more than in others, causing the Tower to unintentionally lean – a whopping 14 feet at one point in time! Soils are now tested prior to any construction to avoid more leaning towers or buildings!

Soils are classified by their *texture*. **Soil texture** is based upon the amount of sand, silt, and clay particles in the soil.

Particle Type	Particle Size (USDA Standards)	It Feels…	Relative Size Comparison
Sand	.05 – 2.0 mm	Gritty	 Barrel
Silt	.002 – .05 mm	Powdery	 Plate
Clay	<.002 mm	Sticky	 Coin

Adopted from http://soil.gsfc.nasa.gov/tbf/relsize.htm#Sand

What is soil made of?



Soils are not just made up of broken down rocks. Soils are made up of a combination of rock particles, *organic matter*, water, and air.

Organic matter is decaying plant and animal matter.

Did you know…?

Soil scientists estimate that it takes more than 500 years to form one inch of topsoil!

Five Factors that Build Soil:

1. **Parent Material** – *bedrock*
   Parent material becomes the non-living part of soil. It can originate from a fresh lava flow, solid granite, or limestone to name a few.

2. **Climate** – *precipitation, temperature, and amount of wind*
   How much does it rain? Is it hot and sunny? Cold? Cloudy? Windy?

3. **Topography** – *the lay of the land*
   Is it hilly? Or flat? Soil at the bottom of a hill gets more water than the soil on the slope of the hill. Soil on the slopes that face the sun will be drier than the soil on the slopes that do not. These all factor into the quality of the soil.

4. **Living organisms** – *plants, animals, and humans*
   The kinds of plants and animals, as well as humans' interactions with the soil, affect the formation of soil.

5. **Time**

How much time has passed? All the above factors influence the amount of time it takes to form soil. Hundreds of years are needed to form just an inch of topsoil.

Earth Day Fun Facts: How Farmers Serve as Good Stewards of the Land

1. They operate methane digesters, which convert methane gas from manure to electricity. One farm in Pennsylvania generates enough electricity to **power 200 homes** per day.

2. They fund and participate in university-sponsored research projects that aim to improve agricultural environmental practices.

3. They plan soil **nutrient management systems** that use manure from their animals to fertilize the land, controlling nutrient runoff and minimizing the need for additional nutrients to grow crops.

4. They utilize rotational grazing, moving livestock to different pastures over time to prevent overgrazing.

5. They select efficient animals that require fewer resources.

6. They follow the Environmental Protection Agency's **best management practices** and meet strict regulations that groundwater, surface water, air quality; animal and manure disposal; land and soil quality; and land use.

Some more food for thought:

The environmental practices that farmers and ranchers follow are rooted in science. Recently, researchers have revealed new information showing the positive impact that meat production can have on the environment. Just this month, the grazing of cattle and sheep was found to **cut emissions of nitrous oxide**, a powerful greenhouse gas.

Useful Resources for Teachers and Parents

- NRCS Soils Website: http://soils.usda.gov/
  - Information for Teachers and Students:
    - http://soils.usda.gov/teachers.html
  - K – 12 Resources:
    - http://soils.usda.gov/education/resources/k_12/index.html

- Soil Science Society of America: http://www.soils.org/lessons/
  - Educational Resources for Teachers

- Dig In!© Hands-On Soil Investigations (K – 4)
  - Published by National Science Teachers Association, www.NSTA.org

- Utah Agriculture in the Classroom: http://extension.usu.edu/aitc/teachers/elementary/dirt.html
  - Lesson plans for a Soil Science Unit for elementary teachers

Educational and Interactive Resources for Students

Extensions for Upper-Level Students:

- http://school.discoveryeducation.com/schooladventures/soil
  - Interactive microscopic safari
  - Suggested for grades 5+

- www.urbanext.uiuc.edu/gpe
  - The Great Plant Escape Case 2: Soiled Again
  - Suggested for grades 4 – 5

Provided by Kansas Farm Bureau to educate young people, parents and teachers about where our food comes from. America's food supply is safe, affordable and abundant but also vastly misunderstood by the consuming public.

It is the intention of Kansas Farm Bureau to improve the public's knowledge about the importance farming and ranching plays in our quality of life.

KANSAS FARM BUREAU®
The Voice of Agriculture®