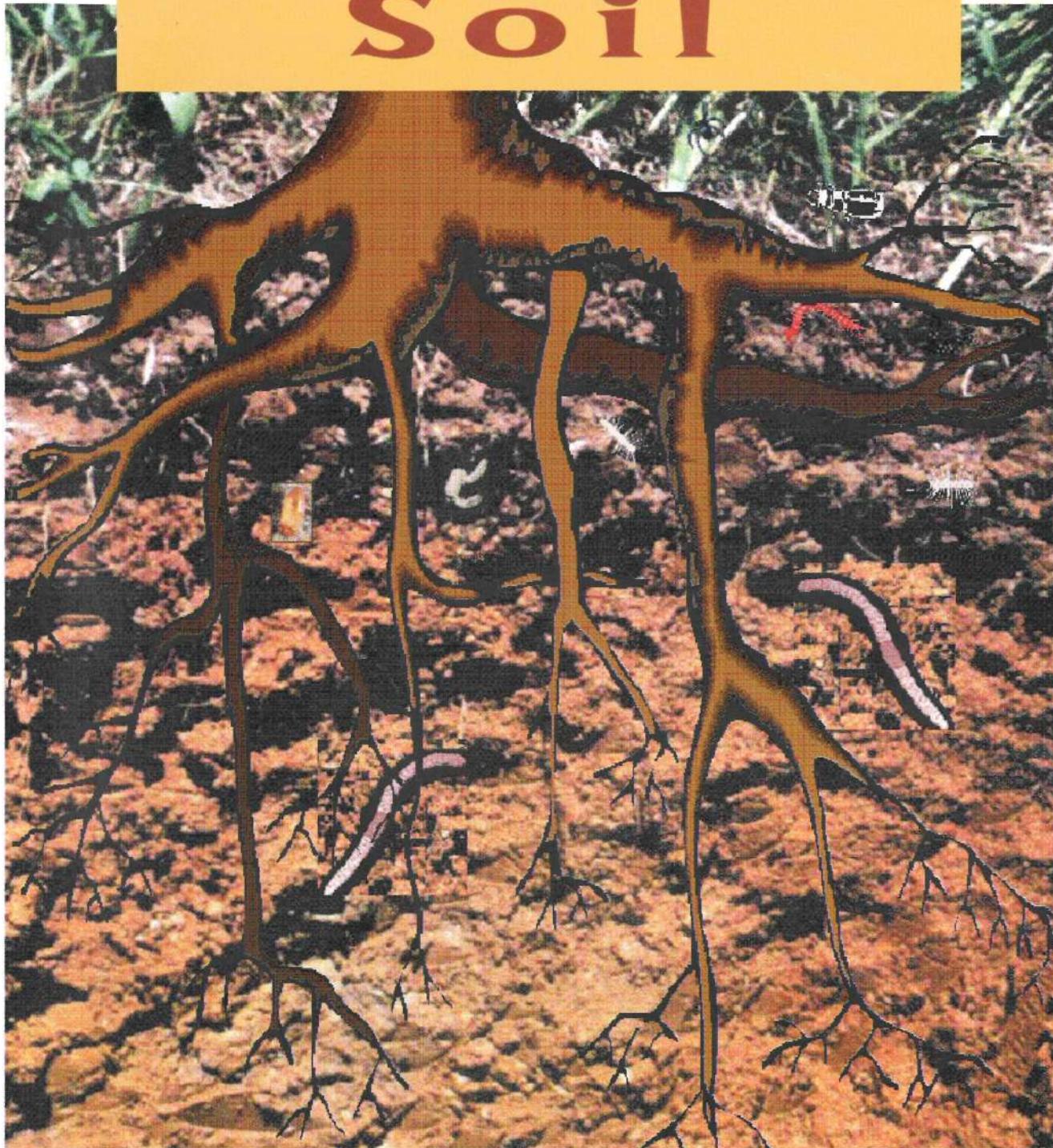


The "Dirty" Facts About: Soil



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WHAT IS SOIL?

- Soil makes up the outermost layer of our planet.
- Topsoil is the most productive soil layer.
- Soil contains organic material, minerals, nutrients, air and water.
- Scientists have identified over 70,000 kinds of soils in United States.
- Different sized mineral particles (sand, silt and clay) give soil its texture.
- Fungi and bacteria help break down organic material in soil.
- Plants roots break up rocks into smaller pieces, which forms new soil.
- Roots loosen the soil, allowing oxygen into the soil. Roots also hold soil together, which helps prevent erosion.



Throughout this booklet, you will learn some amazing facts about soil!

WHERE DOES SOIL COME FROM?



Soil come from the **Parent Material**; parent material is the primary material from which soil is formed. One type of parent material is *organic* material such as leaves, tree limbs, bark, dead animals and bugs. With the help of soil organisms, organic material breaks down into tiny pieces and becomes part of the soil.

Another type of parent material is *inorganic* material, such as the mineral-rich bedrock (hard rock below the earth's surface). Over time, the bedrock is broken down by wind, water, and ice (this is called *weathering*), and forms smaller soil particles - sand, silt, and clay.

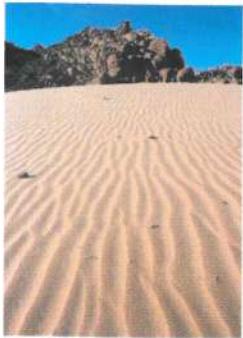
When you combine broken-up pieces of bedrock (inorganic material), and broken-up pieces of organic material (leaves, tree limbs, and dead bugs), you get soil. The source of the parent material determines the soil type.



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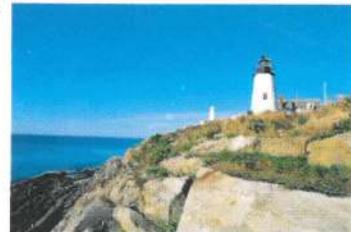
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WHAT IS WEATHERING?

Weather helps make soil. Wind, rain, ice and snow all help to break rocks apart into smaller rock particles. Rock particles break down even more to form soil particles. Roots from plants also help break apart rocks to make new soil. Hot and cold weather also help to expand and break apart the "parent material" forming smaller pieces.



WHY IS IT IMPORTANT TO PROTECT SOIL?

We use soil for many different things such as to **grow our food**, to **make** bricks and concrete, we **build** our homes and schools on top of soil, and we love to **play** in a sandbox. Plants and trees need soil to **grow** and they get their water and nutrients from the soil. Soil is **home** to many living creatures. Without soil, we wouldn't have these important things that help us survive.

Can you think of some things you use everyday that came from soil in some way or another?



EROSION

Everyday, we lose tons of precious soil from **EROSION**. Erosion is caused by the physical wearing of the Earth's surface by wind and water. Erosion is bad because we lose nutrient-rich topsoil; topsoil is very important for plants because they need the nutrients in topsoil to help them grow. Another bad thing about erosion is that many times the soil ends up in our waterways. Too much soil (sediment) in the water clogs fishes gills and fills in our waterways, causing flooding. Finally, when the wind blows exposed topsoil (soil not covered with grass but is left bare), soil gets into the air, making it hard to breathe and hard to see. Motorists have trouble driving when the air is filled with soil as it blows across the road (see picture, right).



If you have any exposed soil in your yard (bare patches), place grass seed or a plant in that area. It is always best to keep soil in its place and keep it covered.

WHAT IS A SOIL PROFILE?

A soil profile is a cross-section of soil layers or *horizons* of soil.
Soil is made up of four main layers called *horizons*.
They are the O, A, B, and C horizons.

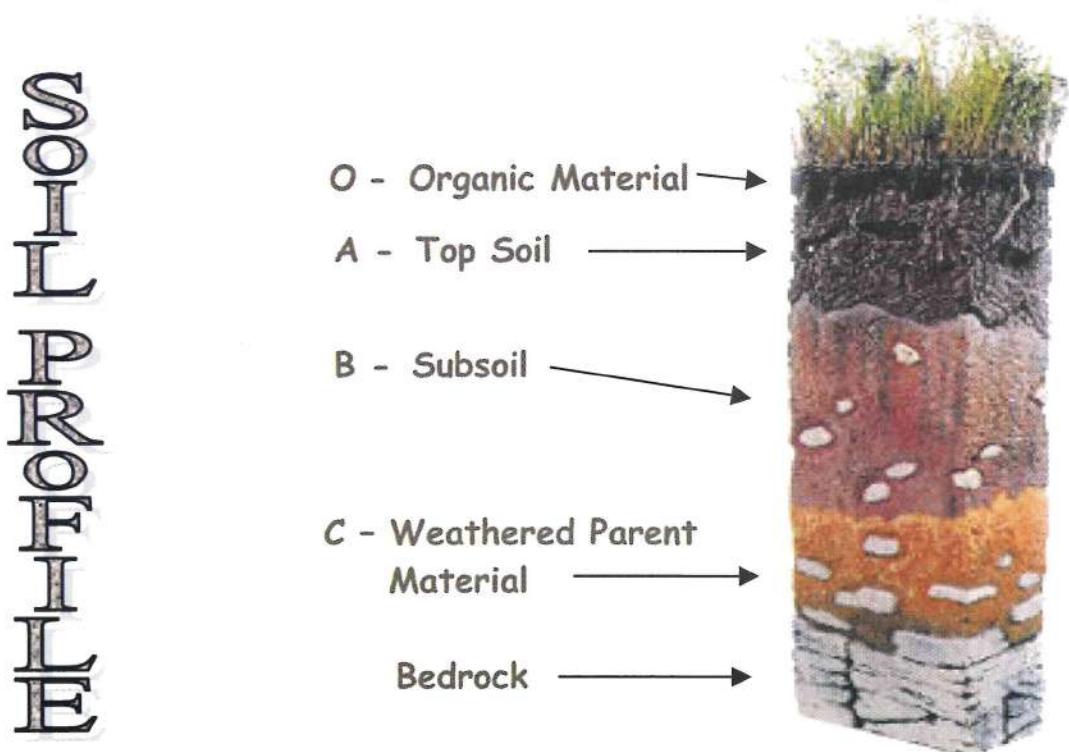
O is the top horizon. It is approximately one inch thick and is made up of leaves and dead stuff (called "organic material"), which breaks down and adds nutrients to the soil.

The A horizon is the topsoil that's alive with roots, insects, and tiny "microstuff" such as bacteria and fungi. The A horizon is the most productive soil horizon.

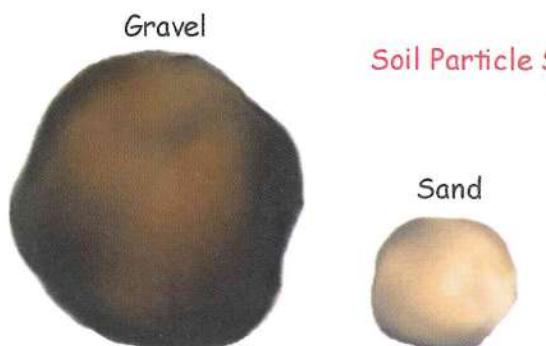
The B horizon is the subsoil. It is low in organic material and the soil is very hard.

The C Horizon has very hard soil and big pieces of rock that have broken away from the parent material. There are also minerals (that have come from the parent material) in this layer.

Below the C layer is the bedrock. Bedrock is solid rock that is under all the soil layers. At one time, weathering broke down the exposed bedrock to eventually form soil particles.



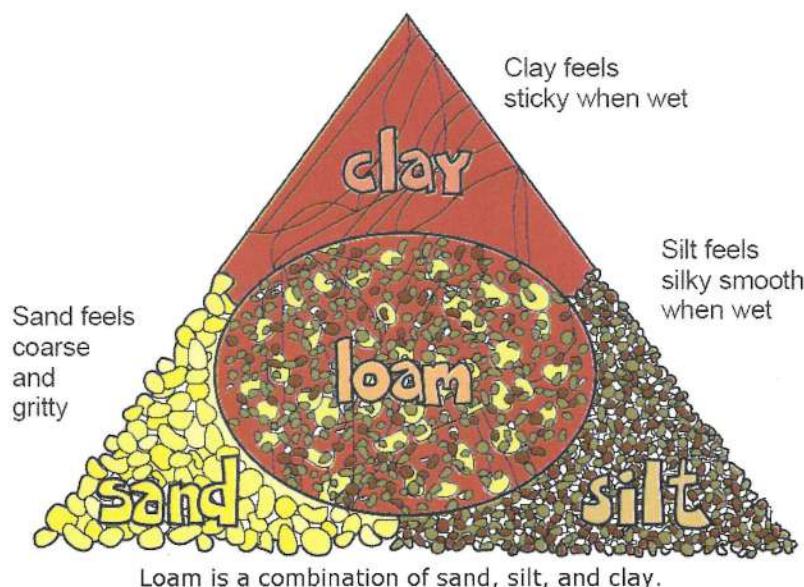
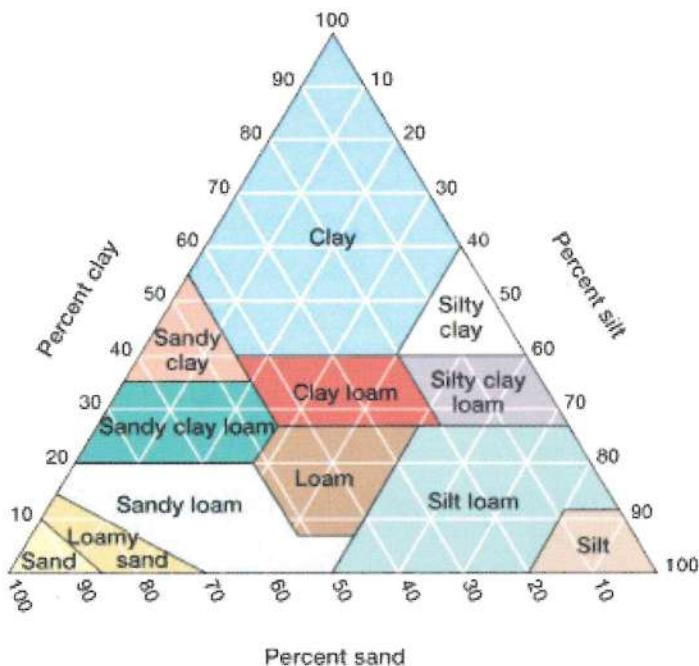
Soil is made up of: different sized particles (sand, silt, clay), minerals, stones, water, air, and organic material (leaves, sticks, living and dead organisms)!



If you compare the size of soil particles, sand particles are the largest and measure from about 0.002- 0.08 inches; silt 0.00008 - 0.002 inches; clay is the smallest at less than 0.00008 inches! Gravel is visible rock particles, sometimes referred to as pebbles (see left).

Soil type is defined by the amount of sand, silt, or clay present in a given sample as well as the texture or how it feels.

When a soil scientist wants to determine soil texture, the soil scientist uses the soil texture triangle (right).



If you take a handful of soil particles and get them wet, how they feel determines what type of soil particles are present. When wet, clay soils feel sticky, silt soils feel silky smooth, and sand feels coarse and gritty.

When you combine equal amounts of sand, silt, and clay, you get loam.

HOW ARE EARTHWORMS "GOOD" FOR THE SOIL?

Earthworms are little "underground farmers" who turn the soil over like a plough. They move soil particles and create tunnels which allow air and water into the soil. Earthworms carry bits of leaves and other organic material into the soil, adding nutrients to the soil (plants need these nutrients in order to grow). Earthworms eat and digest soil and organic material, and deposit castings (worm poop), which is packed full of nutrients! **Earthworms are amazing!**



EARTHWORM FACTS

- There are approx. 2,700 different kinds of earthworms in the world.
- There are approx. 1 million earthworms per one acre of land!
- The largest earthworm ever found was in South Africa and measured 22 feet long!
- Earthworms do not have lungs, but breathe through their skin.
- Earthworms have 5 hearts!



WHAT CREATURES LIVE IN SOIL?

Soil is **FULL** of living things. There's a whole community living right under your feet! If you scooped up a handful of soil and looked at it under a microscope, you would find millions of creatures that rely on the soil to live.

Lets take a look:

Bacteria helps break down dead stuff, and makes a slime to stick to soil particles. This slime helps hold water in the soil.

Amoebas help recycle nutrients in the soil by eating bacteria and then depositing nutrients back into the soil. Plants need these nutrients to grow.

Fungi break down the decaying organic material.

Mites break down the organic material into nutrients that other organisms rely on for food.

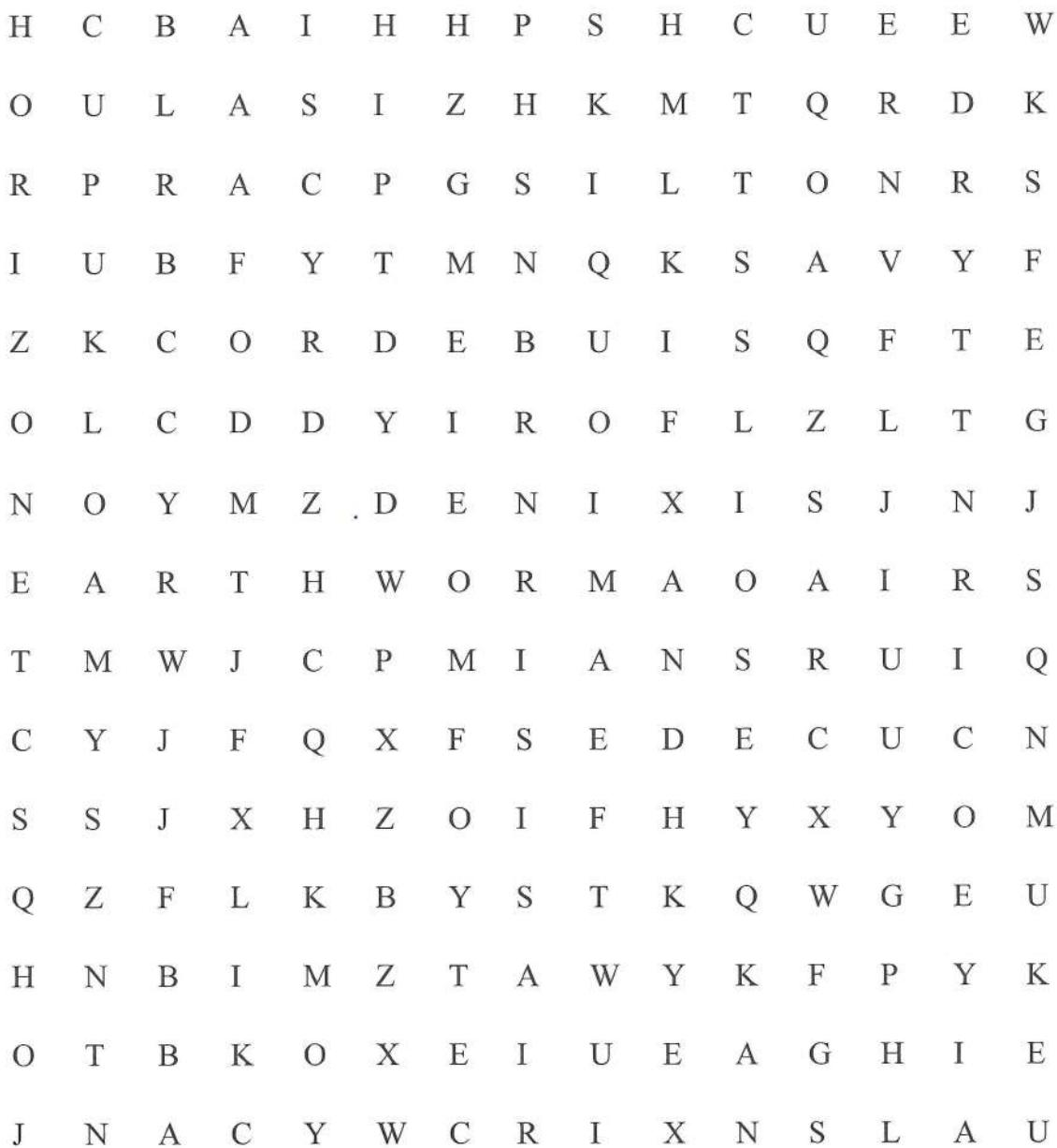
Roundworms are important to soil because they eat bacteria and mites. Without them, bacteria could take over the soil!

And don't forget **earthworms, centipedes, spiders, snakes, moles, and shrews** that make soil their home!





Soil Word Search



BACTERIA

BEDROCK

CLAY

EARTHWORM

EROSION

FUNGI

HORIZON

LOAM

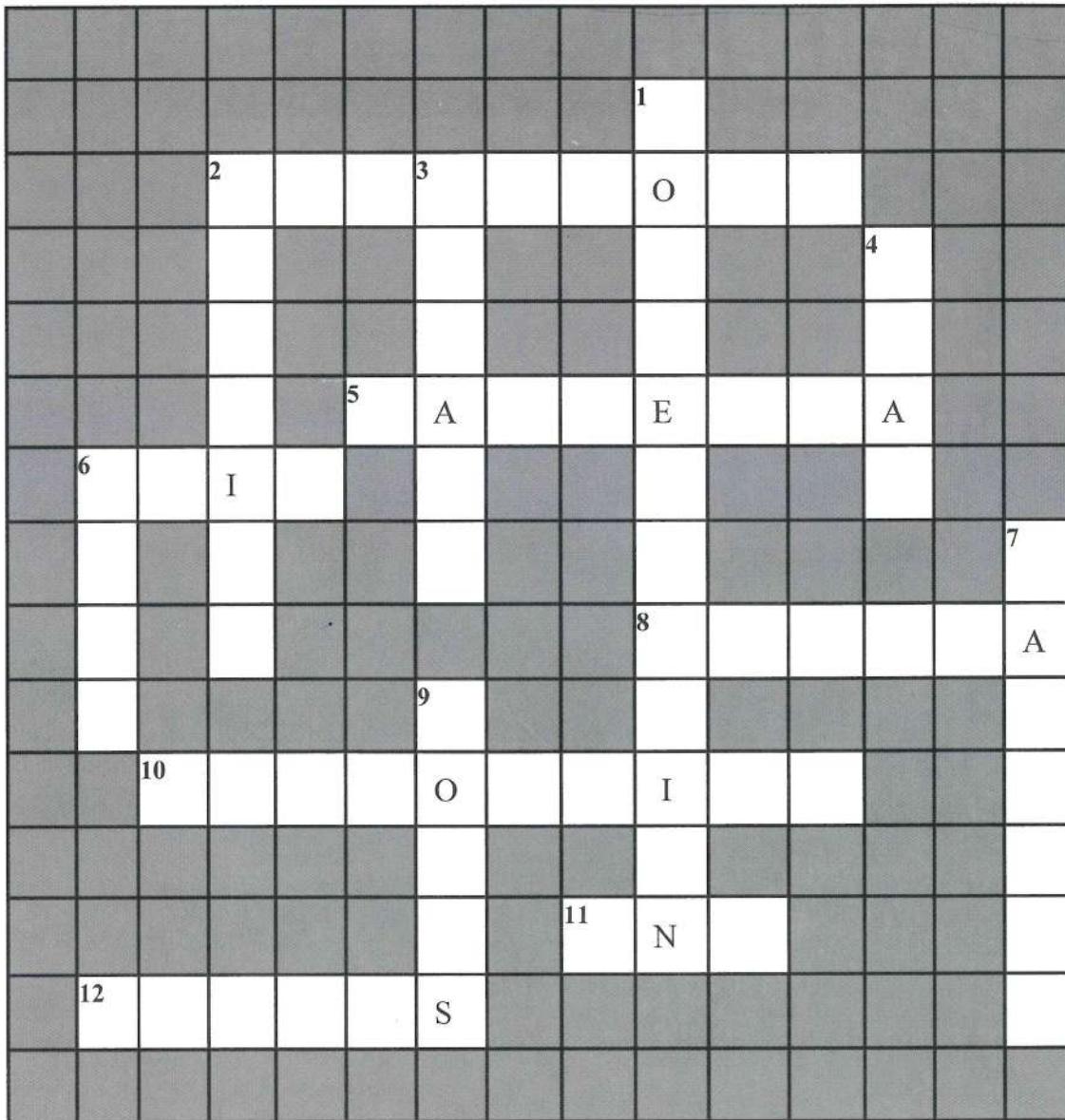
SAND

SILT

SOIL

WEATHERING

Soil Sleuth Crossword Puzzle



Down

1. The protection and preservation of natural resources.
2. Many tons of soil is lost each year by this process due to wind and rain action.
3. A popular garden fruit (some people call it a vegetable). It loves to grow in soil.
4. A combination of sand, silt, and clay.
6. This is the largest soil particle.
7. This is a box that holds sand. Kids love to play here.
9. _____ take up nutrients from the soil to help plants grow and help hold them in place.

Across

2. This tunneling soil creature enriches the soil with its castings.
5. Billions of these live in topsoil. This is what gives soil its “earthy smell”.
6. _____ provides nutrients for plants, and many items you use everyday come from this.
8. A one-celled blob-like creature that moves by stretching and pulling itself.
10. Piling grass clippings, leaves and food scraps; this creates nutrient-rich soil.
11. This hardworking insect makes a home in the soil and lives in groups.
12. Soil has many _____. Not all soils are brown.

Answers: Down: 1. Conservation, 2. erosion, 3. tomato, 4. leam, 5. sand, 7. sandbox, 9. roots
Across: 2. earthworm, 5. bacteria, 6. soil, 8. amoeba, 10. composting 12. colors.