



THE SOIL BENEATH YOUR FEET

GET 'THE DIRT'
ON SOIL.

WORKSHEET - 2
STUDENT COPY

THE SAYING 'COMMON AS DIRT', WHICH APPLIES TO THINGS OF LITTLE OR NO VALUE, COULDN'T BE FURTHER FROM THE TRUTH WHEN TALKING ABOUT SOIL. ALTHOUGH SOIL IS NOT CONSIDERED DIRT – THERE IS CERTAINLY NOTHING COMMON ABOUT IT!

Soil is the medium that makes plant life possible. And since we as humans depend on plants to live, it is easy to see why soil is worthy of some serious thought. So, let's begin with how much you know about soil. Not much? Don't worry we'll give you the 'dirt on soil.' Read on!

SOIL IS ALIVE!

Soil is alive with activity. It is home to millions of insects, animals and microorganisms around the world. In fact, a spoonful of healthy garden soil contains more microorganisms than the number of people on earth! It is also home to animals large and small. Did you know that there are 25 species of earthworms identified in Canadian soils alone?

Much of what lives in the soil requires a microscope to see. The number and size of living organisms in the soil varies from place to place. In fact, a single gram of soil may contain a few hundred thousand bacteria to several billion! Why is this is important? Because bacteria have several important roles including:

- help to decompose plant and animal matter making organic matter
- provide nutrients that plants need
- some types of bacteria absorb nitrogen from the atmosphere and convert it into a form that plants can use

SOIL FOR STORAGE:

In addition to being a home to plants and animals, soil is an essential storage house for water, nutrients and carbon from the atmosphere. In fact, it makes a great storage container. Soils play a role in reducing carbon dioxide, a gas we commonly refer to as a greenhouse gas. Plants absorb the carbon from the air and store it in the soil. Because the soil stores carbon, we need to be careful we don't accidentally release it and add to global warming trends.

WHERE DID SOIL COME FROM?

Soil is formed from what soil scientists call parent material. This represents the elements of the earth that formed the soil – mostly rocks and minerals that were worn down by wind and water.

It takes an extremely long time to make soil. If you were starting with just rock you would need 500 to 1,000 years to make just one inch of soil. Based on our lifespan, this means soil is really not a renewable resource. This is another reason we need to protect the soils we have. We don't have time to make more!

NOT ALL SOIL IS CREATED EQUAL

Although soil does similar things, not all soils are equal. Some soils are better for growing – others are better for building or simply animal habitat. There are tens of thousand different types of soil around the world. Alberta has identified 300 more than in the province alone.

So what makes soils different? Scientists tell us that soil is different based on these 5 things:

- Its parent material – the types of rock, minerals and other material that were a part of its formation. If you dug deep into the ground the large boulders (or bedrock) you found would give you a good hint of the soils' parent material.
- Climate – weather forces such as heat, rain, ice, snow, wind and sunshine break down the parent material and affect how quickly or slowly the soil is formed.
- Organic matter – indicates the number and kinds of plants, animals and bacteria that live and die in the soil leaving nutrient-rich organic matter behind. Animals, from ants to elephants, and plants from tomatoes to peach trees, make the soil different around the world. As humans, we also influence the organic matter by what we put on our fields and in our soils.

SOILS TAKE THE HEAT OFF THE ENVIRONMENT:

Soil helps reduce greenhouse gases by storing the carbon dioxide that plants take out of the air. Soil microorganisms help convert the stored carbon into a form plants can use to grow. Some researchers estimate that proper management of our soils could reduce greenhouse gases in the air from 16 to 42 percent annually.

THINK ABOUT IT:

If soil is a resource the world depends on for food, clothing, energy and many other things, should we protect it? Do you think there are laws protecting the soil? Do you think some countries take better care of their soil than others?

- Topography or location – where the soil is located can affect how weather affects it. For example, soil at the bottom of a hill will get more water and soil than soil on the slope. This is because matter slides down the hill and settles at the bottom. What side of the slope the soil is on also makes a difference. South facing slopes have a better climate will develop soil faster than north facing slopes.
- Time – how long the materials that form soil have been exposed to the effects of wind or water also influence it. Some soils, like those found in a Brazilian rainforest, have characteristics that came from millions of years of intensive weathering. Others, like those of the Canadian plains, which were glaciated only 10,000 years ago and are relatively young.

The combination of these 5 factors gives us soil that is as different as you are from the person sitting next to you.

THE A HORIZON: TOPSOIL

The top part of the soil profile is called the A Horizon. This is usually darker in colour due to higher organic matter. This is the layer where most of the activity occurs. In fact, the total weight of living organisms in the top six inches of an acre of soil can range from 5,000 pounds to 20,000 pounds. That's the weight of a couple of elephants on a space equivalent to your schoolyard.

The A Horizon is exposed to the world above ground. It collects water and nutrients from the air and does most of the essential storing for plants. The A Horizon is where the earthworms tunnel and mix. Earthworm populations increase with organic matter, so if you are looking for them find a dark soil and start digging.

This topsoil is also more prone to change. It acts like a sponge soaking in what we put on it and what burrows into it. The topsoil is also prone to move. It can be blown away by wind or washed away by water. In fact, some soils are carried large distances to resettle in different places. As farmers usually work on, and in the topsoil, this is the layer they are most concerned about. It is important for them to keep it on their fields.



THE EXPLOSIVE ACTION OF ONE RAINDROP CAN HURL A SOIL PARTICLE APPROXIMATELY 90 CM INTO THE AIR AND UP TO 1 METER AWAY!

THE B HORIZON: SUBSOIL

The horizon under the topsoil is referred to as the B Horizon. This layer is usually lighter in colour, denser and has less organic matter than that found in the horizon above. This is often where water and nutrients that trickle in from the surface builds up. Horizon B tends to have heavier soils like clay. When construction companies are building, they scrape off the topsoil build on the subsoil.

PARENT MATERIAL:

The parent material underneath the two main horizons is referred to as the bedrock. Digging through the bedrock would be hard work. It is composed of large boulders of rock. Studying the contents at this horizon tell soil scientists a lot about how the surface soil was formed.

In the next section we will look even more closely at the soil. We'll explore soil property basics like colour, texture and structure and talk about why these are basics are important to farmers and city planners alike.

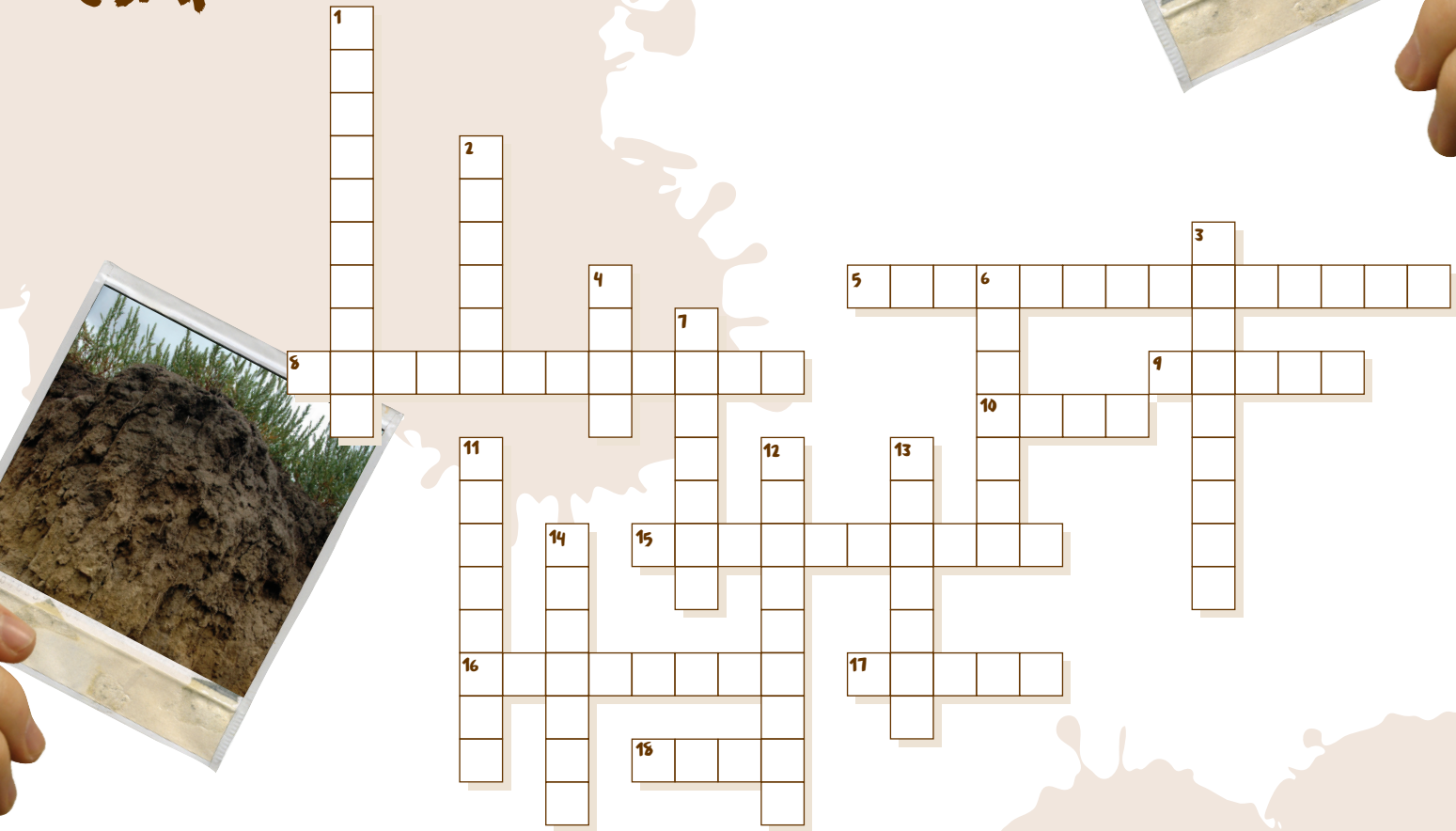
THINK ABOUT IT:

In the desert there is very little water. The animals that live there often get their water from the plants and animals they eat. Some animals, like the desert elephants of Namibia, have learned to dig through the surface soil to the subsoil where water collects. A desert plant, called a mesquite, has roots that can reach 80 feet to find water!

Soil is a crowded place. In addition to housing millions of animals and microorganisms, it needs to make room for plant roots. The plants growing in a wheat field the size of your schoolyard have more than 30,000 miles of roots. That's greater than the circumference of the earth! Can you think of anything else that would hold this many things?

SOIL EXERCISE

COMPLETE THE CROSSWORD PUZZLE!



ACROSS

5. The rock, minerals and other material that formed the soil
8. Saving and preserving resources
9. Decayed plant and animal material that makes the soil fertile
10. Soil type with small granules that holds the least amount of water
15. The process of breaking down rock into smaller pieces due to weather
16. A country can judge its wealth by looking at the quality and quantity of its natural _____
17. Anchors plants and absorbs water and nutrients from the soil
18. Sand, _____ and clay make up soil

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DOWN

1. How plants and animals adjust to their environment
2. Another name for land that is capable of producing food
3. The arrangement or groupings of particles in the soil
4. Soil type with the smallest particles and holds water the best
6. The loss of soil due to wind and water
7. Potential energy source provided by agriculture
11. The smallest organisms that help decompose plant and animal matter
12. Materials in the soil that plants need to live and grow
13. Individual layer of soil
14. The A horizon

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