

Soil Cookies

Overview

Students will learn about the components of soil and how soils are formed through the decoration of a cookie.

Background information

- Why is soil so important?
 - Almost everything on our planet depends on soil:
 - Plants get their nutrients and water from soil
 - It creates food for other animals (animals eat plants that grow in soil)
 - Soil is home to many creatures including mammals, reptiles, amphibians, and insects.
- What are the four main components of soil?
 - Air- the tiny spaces in between soil particles allow for air to flow through the soil which is critical for things living in the soil
 - Water- the air pockets also create a space for water to flow which is important for **infiltration**
 - Soil particles- this includes sand, silt, and clay. These components help determine soil texture which is important in drainage of water through the soil
 - Organic matter- this is living and dead plants and animals that create the dark matter in soil
- What is soil formation
 - **Soil formation** is the process by which soil is formed over time as a result of interactions between parent material (rock), climate (weather), topography (shape of the land), and organisms (living things).
- Where does parent material come from?
 - Parent material is the mineral base from which soil is formed. This can be bedrock, igneous (formed from magma), or metamorphic rock (changed by heat and pressure).
- How does parent material move?
 - Glacial Till- when glaciers move and melt they drop parent materials in place
 - Outwash- is the deposit from water and ice from glaciers
 - Alluvial- stream deposits
 - Lacustrine- lake deposits (muck soils)
 - Loess- movement of parent material by wind
- What is topography?
 - Topography is the shape of land (hills, valleys, elevation, etc.)
- How does topography affect soil formation?
 - **Topography** affects how water moves (speed, direction, etc.)
 - A steep hill will have more **erosion** (movement of soil) than a flat valley
- What is climate?
 - **Climate** is the weather pattern in a particular region

- How does climate affect soil formation?
 - The amount of rain/snow melt can affect how soil and minerals like salt are distributed
 - Temperature also affects how quickly soil forms- the increase in temperature means more organismal activity, which increases the rate of soil formation
- What is an organism?
 - An **organism** is something that is living
- How does an organism affect soil formation?
 - The processes that organisms have changed soil
 - For example, the soils that grew under forests have a smaller organic layer compared to those soils grown under a prairie. This is because each year portions of the prairie plants die and decompose whereas in a forest, the trees live much longer, thus there is less organic material.
- How does time change soil?
 - The previous factors (parent material type, topography, climate, and organisms) keep affecting soils, thus changing them as time goes on.

Supplies

- Graham crackers or cookies (1 per student)
- Chocolate frosting
- blue gel icing
- Green sugar sprinkles
- Gummy worms (1 per student)

Directions

As you go through the creation of a soil cookie, explain each step in relation to soil formation

1. Take the graham cracker- this represents our bedrock or parent material
2. Apply the chocolate frosting giving it high and low points- this represents the topography or shape of the land as soil has moved through the process of air or water (think glaciers and wind)
3. Now apply the blue icing in the shape of a river or lake- this represents climate since rain and snow are the most visible forms of climate
4. Next sprinkle on the green sprinkles and add a gummy worm- this represents organic matter
5. Lastly, is the representation of time....it is time to eat your soil cookie (or save it for later)