

Photo Description



This image shows a cross-section of soil with different layers visible. At the top, you can see dark soil with green plants and their roots growing into it. Below that, there's a reddish-brown layer, and at the bottom is darker soil. The plants' roots are reaching down into the soil to find water and nutrients they need to grow.

Scientific Phenomena

Anchoring Phenomenon: Why do plants need soil, and what is soil made of?

This image demonstrates that soil is a living material composed of multiple layers, each serving different purposes for plant growth. The reddish-brown layer visible in the cross-section contains minerals (like iron) that weathered from rock over long periods of time. The darker layers contain decomposed plant and animal matter called organic material or humus. Plants grow roots into soil because it provides three essential things: water, minerals/nutrients, and physical support. The layering shown happens naturally as soil develops over years and years—rocks break down into smaller pieces, dead plants and animals decay and mix in, and living organisms (worms, insects, microbes) create spaces for air and water.

Core Science Concepts

1. Soil is made of many things: Soil contains broken-down rocks (minerals), dead plants and animals, water, air, and tiny living creatures we cannot see.
2. Soil has layers: Different layers of soil have different colors and textures because they contain different amounts of rock pieces and decomposed material.
3. Plants need soil to survive: Soil provides plants with water, nutrients (food), and a place for roots to anchor and grow.
4. Soil changes over time: Rocks slowly break into smaller pieces, and dead things break down and become part of the soil—this takes a very long time.

Pedagogical Tip:

For First Grade, emphasize the observable, tangible aspects of soil rather than abstract processes. Have students touch real soil, observe its color and texture, and see actual plant roots. Avoid using the term "decomposition" and instead say "plants and animals break down and become part of the soil." Use sensory language: "crumbly," "dark," "wet," "bumpy." This concrete experience builds the foundation for understanding ecosystems in later grades.

UDL Suggestions:

Multiple Means of Representation: Provide soil samples in clear containers at multiple stations so students can examine layers up close. Use real plant specimens with roots visible alongside the photo. Create a simple labeled diagram showing "rocks," "dead plants," and "roots."

Multiple Means of Action & Expression: Allow students to communicate their observations through drawing, sorting activities, or describing soil textures verbally rather than only through writing.

Multiple Means of Engagement: Connect to students' personal experience: "Have you played in dirt? What did it feel like?" This builds relevance and motivation.

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Discussion Questions

1. What do you see in the different layers of this soil? (Bloom's: Remember | DOK: 1)
2. Why do you think the plant's roots are growing down into the soil instead of staying above ground? (Bloom's: Infer | DOK: 2)
3. If we left a pile of dead leaves on the ground for a whole year, what do you think would happen to them? (Bloom's: Predict | DOK: 2)
4. What would happen to a plant if we tried to grow it in sand with no soil? Why? (Bloom's: Analyze | DOK: 3)

Extension Activities

1. Soil Sensory Exploration: Provide students with small containers of different soil types (potting soil, sandy soil, clay-rich soil). Have them observe colors, touch textures, and describe what they feel using words like "smooth," "rough," "crumbly," and "sticky." Ask: "Which soil feels best for planting? Why?"
2. Plant Root Observation: Plant fast-growing seeds (beans, radishes) in clear plastic cups or bags filled with soil so students can observe roots growing downward over 1-2 weeks. Document with drawings or photos. Discuss what the roots are "looking for" in the soil.
3. Soil Layer Model: Have students create a simple soil layer model in a clear jar using actual materials: small pebbles (bottom), sand, dark potting soil, and humus (crushed dead leaves). Add water to show how it soaks through layers. Label each layer and discuss what each one does for plants.

NGSS Connections

Performance Expectation:

- 1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Disciplinary Core Ideas:

- 1-LS1.A Structure and Function – Plant roots help plants get what they need from soil
- 1-ESS1.A Earth Materials – Soil is made of weathered rock and organic material

Crosscutting Concepts:

- Structure and Function – Different parts of soil (rocks, humus, water, air) have different jobs
- Cause and Effect – When plants grow in soil, their roots cause soil to be disturbed and moved

Science Vocabulary

- * Soil: The dark, crumbly material on the ground where plants grow and get water and food.
- * Roots: The parts of a plant that grow down into the soil to take in water and nutrients.
- * Nutrients: Special things in soil that plants need to help them grow strong and healthy.

- * Humus: The dark, broken-down pieces of dead plants and animals mixed into soil.
- * Layers: Different sections of soil stacked on top of each other, like a cake with different layers.
- * Weathering: When rocks slowly break into smaller pieces over a very long time.

External Resources

Children's Books:

- In the Garden with Dr. Carver by Susan L. Roth and AG Ford – Explores plants, soil, and growing things through Carver's eyes
- The Tiny Seed by Eric Carle – Shows how a seed grows with water and soil
- Dig, Dig, Digging by Margaret Mayo – Simple, rhythmic text about soil and what lives in it

YouTube Videos:

- "Soil: What's in It?" by Crash Course Kids (2:58) – Clear explanation of soil components for young learners; <https://www.youtube.com/watch?v=4OMB5pxDy2w>
- "How Do Plant Roots Grow?" by National Geographic Kids (3:15) – Time-lapse footage showing roots growing downward into soil; <https://www.youtube.com/watch?v=xh6uuVx2Hcw>