

## Photo Description



A small plant with green leaves is growing from a clear plastic bottle. The bottle has dark soil inside and is lying on its side. The plant's stem comes out through the bottle opening and has leaves at the top.

## Scientific Phenomena

This image demonstrates seed germination and plant growth as an anchoring phenomenon. The plant has successfully sprouted from a seed and is growing despite being in an unconventional container. This occurs because seeds contain everything needed to start a new plant - stored food, a tiny plant embryo, and a protective coat. When given the right conditions (water, warmth, and eventually light), the seed breaks open and the plant begins to grow, using its stored energy until it can make its own food through photosynthesis.

## Core Science Concepts

1. Seed Germination: Seeds contain baby plants that grow when they get water, warmth, and air
2. Plant Needs: Plants need water, light, air, and nutrients from soil to survive and grow
3. Plant Parts: Plants have roots (in the soil), stems (the main body), and leaves (for making food)
4. Growth and Change: Living things grow and change over time as part of their life cycle

### Pedagogical Tip:

Use clear containers like this bottle to make plant growth visible to students. They can observe roots developing and track daily changes, making abstract concepts concrete and observable.

### UDL Suggestions:

Provide multiple ways for students to document plant growth: drawing pictures, taking photos, measuring with non-standard units like paper clips, or dictating observations to support diverse learners and communication styles.

## Zoom In / Zoom Out

1. Zoom In: Inside the seed, tiny cells are dividing and growing to form roots, stems, and leaves. The plant is using stored starches and proteins as food until its leaves can start making sugar from sunlight.
2. Zoom Out: This single plant is part of a larger cycle where plants grow, reproduce, make seeds, and create new plants. Plants also help clean our air and provide food for animals in ecosystems.

### Discussion Questions

1. What do you think this plant needs to keep growing bigger? (Bloom's: Apply | DOK: 2)
2. How is this plant the same or different from plants growing outside in a garden? (Bloom's: Analyze | DOK: 2)
3. What might happen if we put this bottle in a dark closet for a week? (Bloom's: Evaluate | DOK: 3)
4. Why do you think the person chose to grow the plant in a clear bottle instead of a regular pot? (Bloom's: Analyze | DOK: 2)

### Potential Student Misconceptions

1. Misconception: Plants eat soil for food  
Reality: Plants make their own food using sunlight, water, and air. Soil provides support and some nutrients, but not food.
2. Misconception: Seeds are not alive until they start growing  
Reality: Seeds are living but dormant, waiting for the right conditions to begin growing.
3. Misconception: Plants don't need air  
Reality: Plants need air (carbon dioxide) to make food and oxygen to breathe, just like animals.

### Cross-Curricular Ideas

1. Math - Measurement & Growth Tracking: Have students measure the plant's height using non-standard units (paper clips, blocks, or their finger width) every few days and create a simple bar graph or picture graph to show how tall the plant grows. This connects measurement, data collection, and visual representation.
2. ELA - Plant Growth Storytelling: Students can create a "life story" of the seed by drawing and labeling pictures in sequence (seed !' sprouting !' growing !' plant), then dictate or write simple sentences describing each stage. This builds sequencing skills and narrative thinking.
3. Art - Observational Drawing: Have students sketch the plant and bottle from different angles over time, noticing how the leaves change shape, size, or color. This develops fine motor skills, observation skills, and an appreciation for nature's details.
4. Social Studies - Where Plants Come From: Discuss how seeds travel to different places (wind, animals, water) and how people around the world grow plants for food and beauty. Connect to community gardening or farmers' markets in your local area.

### STEM Career Connection

1. Botanist - A botanist is a scientist who studies plants! They learn about how plants grow, what they need to be healthy, and how to help plants that are sick or endangered. Botanists might work in gardens, forests, or laboratories. Average Annual Salary: \$62,000 USD
2. Farmer or Gardener - Farmers and gardeners grow plants to feed people and make communities more beautiful. They use science to know when to plant seeds, what soil plants need, and how much water and sunlight to give them. Average Annual Salary: \$48,000 USD (varies widely by region and operation size)

3. Environmental Scientist - These scientists study how plants help keep our Earth healthy. They learn about forests, grasslands, and wetlands, and work to protect plants so that animals and people have clean air, water, and food. Average Annual Salary: \$68,000 USD

### NGSS Connections

Performance Expectation: 2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Disciplinary Core Ideas:

- 2-LS2.A - Interdependent Relationships in Ecosystems
- K-LS1.C - Organization for Matter and Energy Flow in Organisms

Crosscutting Concepts:

- Patterns - Observable patterns in plant growth and development
- Cause and Effect - Plants grow when their needs are met

### Science Vocabulary

- \* Germination: When a seed starts to grow into a new plant
- \* Seedling: A young plant that has just started growing from a seed
- \* Nutrients: Special materials from soil that help plants stay healthy
- \* Life cycle: The stages a living thing goes through as it grows and changes
- \* Photosynthesis: How plants make their own food using sunlight, water, and air

### External Resources

Children's Books:

- From Seed to Plant by Gail Gibbons
- The Tiny Seed by Eric Carle
- A Seed Is Sleepy by Dianna Hutts Aston