

## Water Bottle Plant Growth

### Materials:

- Index cards
- Gravel
- Soil
- Bean seeds (or other variety)
- Grass Seed (optional)
- Water Bottles (empty; one per student, pair, or trio)
- STEM Notebook/Journal
- Pencils
- Rulers (metric suggested)
- Other “Variable Items” as outlined below

### SEEd 5.3 Cycling of Matter in Ecosystems

#### Standard 5.3.1

Construct an explanation that plants use air, water, and energy from sunlight to produce plant matter needed for growth. Emphasize photosynthesis at a conceptual level and that plant matter comes mostly from air and water, not from the soil. Photosynthesis at the cellular level will be taught in Grades 6 through 8. (LS1.C)

This lesson goes along with our SEEd Standard 5.3 Unit and is done over the course of the unit, one month minimum. The goal of the lesson is for students to have a hand in plant growth, observe and record data, and create a scientific test by changing a single variable.

#### Unit Opener:

- Where does a plant get its mass? Use this question to start discussions but DO NOT answer this until the end of the unit. These two videos could be viewed: [Scientia](#) and [Mass of Trees](#))

#### Lesson:

- Ask students how a seed becomes a plant ([Sci Show Kids Video](#) could support this) and show a time [lapse video of a plant growing](#).
- Ask what plants need to grow? Have them write these things in their journal. They could even draw out the parts of a plant (5th grade level). I have them add to this as we go through the entire unit
- Once they have decided the needs of plant ([remember SEEd 5.3.1](#)), narrow it down for the idea of planting a seed with in a container (your water bottle with top 1/5 cut off), a layer of gravel for moisture reasons, larger layer or soil, sunny location, and water as needed. Explain that the class will do this but only ONE

plant will be grown in these CONTROL conditions. All other plants will be grown with a single change from the control. Ask students for ideas on what conditions could be changed/tested?

- Once they have explored some ideas, place them in small groups and let each group choose their variable to change. I only allow one group per idea. Have students journal their ideas and make a hypothesis on what will occur.
- In your next class season, students will plant their plants accordingly. Assemble the control plant in front of students and record exact measurements for students to copy as they assemble their plant. I usually have the bottles all precut, add about  $\frac{1}{4}$  cup gravel,  $\frac{2}{3}$  cup soil, 4 bean seeds, and a pinch of grass seed, and then about 30mL water. We all water consistently and measure the water each time. We all place the plants in the same area near the window and we even start the plants with the top of the water bottle inverted so the moisture is retained.
- Have students observe their plants and record their observations throughout the month (good time for metric measurement).
- Ideas for “Variable Items” to change:
  - No water
  - Double the water
  - Triple the seeds
  - Dark area/no light -this one is cool for students to see
  - Hot Water
  - Cold Water
  - No gravel -only soil
  - No Soil-water only
  - No Soil -gravel only
  - Sugar water
  - Salt water
  - Gatorade water
  - Wood Chips instead of Soil
  - Clay (model magic) instead of soil)
  - Seal in Plastic Bag and try to remove all oxygen
  - Worms Added (decomposer)
- Extensions for great discussion:
  - [SEEd Storylines](#)
  - [Mystery Science Web of Life](#)
  - Discuss [Biosphere 2](#)
  - [Terrarium](#)
  - [Aquaponics](#)
  - [AeroGarden](#)
  - [Vertical Gardening](#)
  - [Science Unit](#)