

Soda Bottle Compost: Nutrient Cycling in Action

Description:

This lesson allows students to learn, through their own experimentation, the important role wildlife play in nutrient cycling. Earthworms and compost are used in this experiment and different experimental setups will be evaluated. This lesson will appeal to students who prefer more hands-on activities that extend for a short duration of time. Skills acquired in this lesson include data collection and conduction a controlled experiment.

Goals:

Students will learn

1. The importance of making and recording detailed observation
2. The importance of conducting soil tests consistently and accurately
3. The importance of conducting a controlled experiment correctly

Objectives:

Students will be able to

1. Evaluate the importance of plant and animal matter as contributors to soil
2. Recognize that wildlife in many forms contributes to the diversity and balance of ecological systems
3. Describe nutrient cycling and the role it plays in all ecosystems

Materials:

Materials listed are per group

- 6 empty 2-liter soda bottles of the same color (lids included)
- Scissors
- Nutrient poor soil (roadside, etc.)
- Organic garbage (egg shells, fruit peels, coffee grounds, leaves, etc.)
- 5-10 night crawler worms
- Soil pH test kit
- Soil nutrient test kit (NPK)
- 300 mL beakers
- Plastic spoons
- Plastic or latex gloves

Time:

2 50-minute class periods per week for 3-6 weeks

Procedures:

Experimental Setup

1. Cut off the bottom of 3 soda bottles. Poke 4-5 small holes into three lids and place on the remaining half of the soda bottle. Cut off the top of the 3 remaining soda bottles. Invert the first bottle and place in the second bottle. This allows for collection of excess water. Fill each bottle with soil approximately 3 inches from the top of the bottle.

2. Have students test the soil for initial pH, nitrogen (N), potassium (K) and phosphorous (P) levels using an “at home” soil test kit, usually obtained at Home Depot. Also have students make initial observations of soil conditions (I.e., look for organisms under a microscope, test soil porosity, general appearance of soil, etc.)
3. After the soil tests have been completed and recorded, it is time to see what contributions at least one form of wildlife can make to the richness of the soil. One container is the “control”. The second is for soil and organic scraps (compost) and the third is for soil, organic scraps and earthworms.
4. Add compost to containers 2 and 3 in equal amounts. For example: 3 eggshells, one banana peel and _ cup of grass clippings, etc. Compost will vary depending on what is available. The most important part is that each container receives approximately the same kind and amount of compost. Add 5-10 earthworms (depending on size) to container 3. Gently mix the contents of each container as to not spill or injure the worms. Gently cover with paper towel and place in safe area of classroom.
5. For the next 3 to 6 weeks, continue by adding equal amounts of compost to containers 2 and 3 once a week and water lightly once per week (container 1 included). The water amount may vary due to differences in humidity and/or temperature in each individual classroom, but the amount of water should be consistent in all 3 containers.
6. Soil tests (pH, N, P, K) should be conducted on a weekly basis and results recorded. Simple soil test kits can be obtained at local garden and/or home improvement stores.

Lab Write-up

1. After setting up the experiment, have students hypothesize the results after 3 to 6 weeks of experimentation. Have them write down their hypothesis to compare with their findings.
2. Have students keep track of general observations, soil test measurements and additional materials added to the experimental groups.
3. Have students discuss findings amongst themselves and ask them to draw conclusions based on the data recorded for several weeks.

Evaluation:

Have students list three or more ways the earthworms contributed to the nutrient content of the soil.

Have students explain the importance of subterranean organisms (organisms that live in the soil) and the contributions they make to ecosystems.

Have students write a story about what would happen to an ecosystem if there were no worms or other organisms in the soil.

Extensions:

Have students create a poster that displays their hypothesis, materials and methods, results and conclusions. Include pictures!

Perform experiment on a larger scale. Use large plastic boxes or construct compost pits on the school grounds.

Conduct experiment over the course of six or more weeks. Deeper insights can be made over a longer period of time.

References:

1992. Project Wild: Council for Environmental Education pp. 76-77.