



## Lesson Bundle

- Milk Jug Composting
- Soil Your Undies
- Build a Bee Hotel
- Desktop Garden

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# Milk Jug Composting

## Objectives:

The student will

- Explore how organic material decomposes and becomes part of the soil.
- Create a compost jug in order to investigate decomposition.
- Understand how worms play an important role in nutrient rich soil.

## Materials:

- Clear, plastic gallon jug
- 2 plastic plates, 1 with holes
- Gravel
- Bedding mixture: shredded paper, peat moss, grass clippings, leaves, dryer lint, etc.
- Water
- Red worms (can be purchased via Amazon)
- Chopped fruit and vegetable scraps
- Plastic garbage bag

## Background Knowledge:

Soil is a vital natural resource as the majority of our food depends on it for growth and production. Natural soil is something that comes from rotting plants and other materials. Rotting plant materials make the soil rich in nutrients. This is a natural cycle called decomposition. Composting speeds up and intensifies decomposition.

Worms are very beneficial to healthy soil, in fact, they are often called the gardener's best friend. They act as nature's recyclers because they eat both living and dead plant material. When they digest this material it is passed back into the soil as nutrient rich "castings." Castings contain much nitrogen, potassium, and phosphorus that are nutrients that are essential to plant growth. Each day an earthworm produces its weight in castings. Further, as worms burrow into the soil, they aerate the soil which loosens it and allows plant roots to deepen in the soil.

## Procedure:

1. Cut the top from a clean, clear plastic milk jug. Poke holes in the bottom of the jug for drainage. Poke small holes on the sides for air flow. Place a plastic plate or dish underneath to collect excess drainage.
2. Add 1 inch of gravel to the bottom of the jug. Poke holes in a plastic plate and place over the gravel. Create a simple bedding mixture with shredded, moist newspaper and lay on top.
3. Add 3-4 worms. Red worms will eat the garbage.
4. Sprinkle some fruit and vegetable scraps on top of the worms. You may choose to put the scraps in a food processor or blender first to make them easier for the worms to eat. Cover with more bedding materials. Spritz with water from a spray bottle, being careful not to soak the contents.
5. Place a plastic garbage bag on the top so to control the moisture level and provide darkness. You may remove it daily to gently stir and record observations. Add water and food as needed.

## Objectives:

The student will

- Understand the impact of soil organisms on soil health and the environment.
- Define decomposition.

## Materials:

- White 100% cotton underwear or t-shirt
- Shovel
- Landscape flag or label

## A day in the life of a soil scientist:



## Background Knowledge:

The soil under our feet is much more than just dirt. In fact, it is an ecosystem full of life. In this lesson students will observe decomposition as organic matter (100% cotton underwear or t-shirt) is broken down by organisms living in soil. One teaspoon of healthy soil contains more microbes than there are people on the planet. These microbes break down organic matter like cotton, while also helping soil retain nutrients and moisture.

Healthy soil is vital to farmers as well as all plants, animals and humans. Farmers implement healthy soil practices such as reduced or no-till, planting cover crops and nutrient management. Such practices benefit both the crops as well as the soil and water.

## Procedure:

1. Select a location on the school grounds to bury your 100% cotton underwear or t-shirt. Take a picture of the item before burial
2. Dig a hole and plant the underwear at least 4 inches in the ground. Place a landscape flag or label to mark the site. Record observations about the site, such as—What color is the soil? Can you see any organisms in the soil?
3. Wait 60 days. Have students make hypotheses about what they think the underwear will look like. Carefully, dig them up and compare them to both the “before” picture as well as students’ hypotheses.
4. Discuss the results. Remember, the more decayed the underwear the more active and healthy the soil.

## Extension:

Bury two pairs in different spots and compare the results.



# Build a Bee Hotel

## Objectives:

The student will

- Understand the importance of bees as pollinators
- Design and build their own “bee hotel”

## Materials:

- Washed and empty tin can (such as from soup or beans) with lid removed
- Paint or non-washable markers
- Sheets of scrap paper (you may also use brown paper bags)
- Scissors
- Pencil
- Tape
- Glue
- Twigs, bark
- String

## Background Knowledge:

Pollination is the process of transferring pollen from the anther to the stigma of a plant. This process allows the plant to fruit and produce seeds. Nearly 1/3 of the world’s food supply relies on pollination by insects such as bees. In fact, bees are considered to be the “champions” of pollination. Native bees in Virginia include bumble bees, mason bees, squash bees, sweat bees, leaf-cutter bees, mining bees, longhorn bees and carpenter bees. All bees need a place to lay their eggs so that their larvae and pupae can safely develop. While the majority of bees live underground in hollows and tunnels, there is also an important population of nesting solitary bees. Leafcutter and mason bees are two such species.

## Procedure:

1. Review the importance of bees as pollinators.
2. Give each student an aluminum can to decorate using paint or permanent markers. Bright colors are more likely to attract bees!
3. Distribute scrap paper. Have students cut their paper into strips. Each piece should be approximately 2-2.5 inches wide and just slightly shorter than the can.
4. Students should use pencils and markers to roll each piece of scrap paper. Tape each piece and remove from the pencil/ marker. You may choose to have students use pencils and markers of various sizes to create variety in your rolls.
5. Fill the can with the rolled paper. Fill in holes between paper rolls with twigs and bark.
6. Wrap two pieces of string around the can, one near the top and one near the bottom. Leave enough string to hang from a tree branch.

## Objectives:

The student will

- Understand the conditions necessary for seed germination

## Materials:

- Seeds
- Spray bottles with water
- Clean lids from jars such as mayonnaise or peanut butter
- Paper towels or napkins
- Sandwich size plastic baggies



## Background Knowledge:

In order for a seed to germinate, or sprout, it needs warmth, moisture, and air. Seeds remain dormant and will not germinate until the proper conditions are present. For example, in some climates the winter soil temperature may dip to below 32°F. Seeds will not sprout in these conditions. Once the ground thaws in the spring and the temperature rises to approximately 65°F, most seeds will sprout if moisture and air are also available. Most seeds germinate when the temperature is between 65-85°F.

In the germination process, moisture softens the seed's outer protective covering, called the seed coat. The embryo pushes through the softened seed coat and the new plant begins to grow. The roots push further down into the soil and a shoot, which contains the new plant's stems and leaves, pushes up towards the surface.

The germination process can be somewhat mysterious because it typically occurs underground where it cannot be observed. This activity provides an opportunity to view the germination process and the plant's beginning growth and root system.

## Procedure:

1. Review seed germination using the Background Knowledge above.
2. Pass out one jar lid and paper towel/napkin to each student. Fold the paper towel/napkin to fit inside the lid.
3. Sprinkle seeds onto the paper towel.
4. Spray the seeds and paper towel until the paper is thoroughly wet.
5. Place inside a plastic baggie so that it will not dry out.
6. You may choose to put these on a windowsill or have students keep them on their desks to observe each day.