

Turning Food Scraps into Black Gold

Primary - East Africa

Key Inquiry Questions

1. What can we do with food waste that cannot be recycled or reused?
2. What is composting and why is it important?
3. How does composting actually work?

Learning Outcomes

1. Students will be able to define biodegradable and nonbiodegradable materials, and compost by the end of the lesson.
2. Students will learn the importance of composting by the end of the lesson.
3. Students will be able to understand how composting works by the end of the lesson.

Sustainability Curriculum Goals

Systems Thinking:

1. All forms of life, including humans, are connected to each other through man-made and natural ecosystems on which their well-being depends on.

Sustainable Futures:

1. Actions associated with a sustainable future reflect values of care, respect, responsibility, empathy, and compassion for all living and nonliving things.

Activities/Goals:

1. Students will engage with sustainable agriculture, water and land conservation, and proper waste disposal practices.
2. Students will have a greater awareness of climate change and adaptation/mitigation strategies.

Overview:

The lesson will begin with students learning the difference between biodegradable and nonbiodegradable materials. They will learn that biodegradable materials, such as food waste and leaves, can be broken down by tiny organisms, such as worms, and used to create a soil amendment (i.e. compost!). Students will compare composting to how leaves are recycled and turned back into nutrients for the soil to understand what composting does. Next, students (as a class or in groups) will create their own compost soda bottle. At the conclusion of the lesson, students will understand the importance of composting and how to do it on a small scale.

Materials

SolarSPELL Resource:

1. Worksheet titled “Doing the Rot Thing”

Other:

1. Science journals
2. Pencils
3. Food scraps from breakfast/lunch
4. 2 x Liter Soda Bottles (or one Soda Bottle per group)
5. Soil
6. Tape (if available)
7. Scissors
8. Spray bottles or cups of water (one per soda bottle)
9. Paper

Suggested Procedure

Before Lesson:

Recommendation: Complete the lesson plan on Rubbish and Recycling prior to this lesson.

- Students will begin defining what it means for a material to be biodegradable by discussing different examples of what is biodegradable.
 - Tell students that, as they have learned, we use resources from the earth daily for everything that we do.
 - For example: We eat food, drink from aluminum cans, glass bottles, or plastic bottles, live in houses made from wood, and wear clothing made from cotton.
 - Materials like metal, glass, and plastic cannot be broken down by tiny organisms living in the soil (they are non-biodegradable).
 - Alternatively, materials like wood, food scraps, and paper can be broken down by tiny organisms, such as bacteria and worms, in the soil (they are biodegradable). These items return nutrients to the soil for more resources to be grown!
- Option 1: Create a list of items that can and cannot be broken down.
 - If able, write this list on the board.
 - Have students make two columns in their journals.
 - One column should be labeled “Can be Broken Down” and “Can NOT be Broken Down”
 - Call out an item from the list and ask students to raise their hands if they think it can be broken down by the tiny organisms.
 - Ask students to raise their hands if they think it cannot be broken down.
 - Call out the correct answer and have students write it down in the corresponding column.
 - For example: You could write down or announce “mango peel”. Mango peels can be broken down, so it belongs in the first column.
- Option 2: On the board or on individual sheets of paper, give students 3 minutes to list as many items that can be broken down as possible.

- Bring a ball outside with you and the students and have them stand in a circle.
- Begin by calling out a student's name and ask them to shout out something that can be broken down.
- Toss the ball to the students and then have the students sit down.
- Students continue shouting out a peer's name for them to share something that can be broken down and passing the ball until all students are sitting.
- For round 2, have students stand up again and you [the teacher] start standing in the middle.
 - The person in the middle has the goal of tagging the student who has the ball before the ball is tossed to the next student.
 - Like before, the student with the ball names something that can be broken down and throws the ball to one of their peers before the person in the center can tag them.
 - If the student with the ball does not name something before they throw the ball and is tagged, that student switches spots with the student in the center.
- Ask students if they think the items that can be broken down can be recycled?
 - Answer: Yes!!
- Tell students (and have them write this in their journals) that materials that can be broken down can be recycled through composting.
- Explain that composting is nature's natural process of recycling!!

During Lesson:

- Ask students if they know what happens to leaves in a forest after they fall down on the ground?
 - Answer: Explain to students that nature recycles leaves. In a forest, after leaves fall, they break down into nutrients that feed the forest plants and trees.
- Explain to students that composting models nature, but breaks down food instead of just leaves. By adding compost to plants, the soil receives nutrients to soil in place of using pesticides/chemicals/or fertilizers from cows. It makes for healthy plants that humans and animals need for survival.
- At this time, students may wonder what the difference is between a landfill/throwing food away that can be broken down and composting?
 - Explain to students that in landfills or dumps, food waste breaks down and produces methane gas. This gas is even more harmful to the environment than CO2 and results in increasing the rate of climate change.
- Students will now have the opportunity to see how composting works:
 - Note: this activity can be done as a class or in groups depending on the amount of materials you have access to and will take at least 4 weeks to complete.
 - 1. Have students collect their food scraps during breakfast and/or lunch.
 - Scraps can include all vegetable/fruit waste, and coffee grounds.
 - Bones or meat should not be collected.
 - 2. Rinse out the soda bottles and cut the top off (the top is the side with the cap).
 - This can be done before class to make the process easier.

- 3. Put one handful of soil into the bottom of the bottle, then a handful of the food scraps. Repeat this layering process twice, then add a third layer of soil, and on top of that add a layer of paper. Then put another layer of soil, followed by another layer of food scraps, and top it off with a layer of soil.
 - If the soil is dry, spray each layer of soil with water until it is as damp as a sponge.
 - Explain to students that compost needs an equal amount of green material (the food scraps) and brown material (soil, sawdust, paper without ink on it, sticks, leaves) to work.
- 4. Spray the top layer of soil until it is as damp as a sponge.
 - Explain to students that water and air are important to making sure the bacteria can breakdown the waste.
- 5. Tap the lid back on (if tape is not available, the composter will still work without the lid taped back on)
 - See example of the final product at the bottom of the lesson plan.
- 6. Place the soda bottle composter in the sun.
 - Note: if it is raining, place the soda bottle in the shade or in a window that receives sunlight so it does not wash away.
- 7. Have students check on their bottles every day to make sure the top layer of soil is not getting too dry.
 - Students should use a long stick to mix the compost daily as well.
- 8. Continue checking on the soda bottle daily for 8 weeks. Though it will take time, students should go out once a week to write down their observations of what is happening.
- 9. After 4 weeks, students can take their compost in use it to grow plants!!
 - The compost is ready when it is brown, crumbly, and feels like normal soil. If there are still lots of chunks, students should wait another week.

After Lesson:

- Now that students have an idea of what compost is, ask students why they think composting could be important and useful for their community?
 - Possible answers: composting leads to less food being sent to the landfill, composting returns nutrients to the soil we took them from by growing our crops, using compost reduces the need for pesticides/chemicals.
- Handout the worksheet titled “Doing the Rot Thing”.

Example of Soda Bottle Composting System:



Doing the Rot Thing

Which of the following is not an important part of composting?

- A. Air
- B. Water
- C. Fire
- D. Green Material
- E. Brown Material

Which of the following steps should be taken to make sure your compost breaks down as fast as possible (circle all that apply).

- A. Mixing the compost
- B. Soaking the compost with water
- C. Chop of food scraps to make them easier to break down

Draw a square around the greens and a triangle around the browns.



ANSWER KEY:

Doing the Rot Thing

Which of the following is not an important part of composting?

- A. Air
- B. Water
- C. **Fire**
- D. Green Material
- E. Brown Material

Which of the following steps should be taken to make sure your compost breaks down as fast as possible (circle all that apply).

- A. **Mixing the compost often**
- B. Soaking the compost with water
- C. **Chop of food scraps to make them easier to break down**

Draw a square around the greens and a triangle around the browns.

