

STEAM Subject: Ecology
Lab: Composting at Home

Grades: 2nd-5th

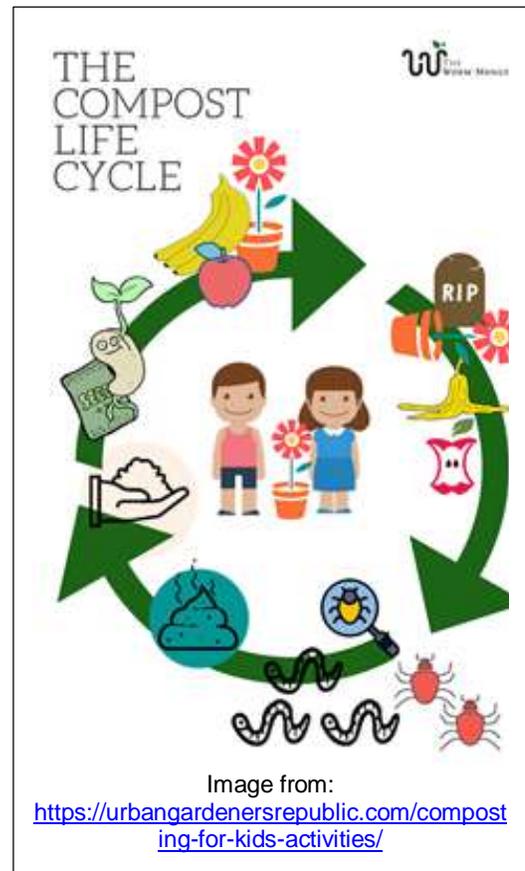
Learning objective:

Students will be to identify what items can be compost and communicate solutions to reduce the impact of humans on Earth.

ENGAGE:

Ask students the following questions:

- What is compost and what is it made of?
 - **Compost** is a fertilizer used to help plants grow. Typically, it is made up of organic matter, such as vegetable scraps, coffee grounds, fruit peels/rinds, bread, shredded paper, dead leaves, and grass clippings. This organic matter mixes with soil and is broken down by worms, bacteria, fungi, and other decomposers to create nutrients.
- Why is compost beneficial? (For the environment, for the garden, for people)
 - Compost enriches soil, decreases plant diseases and pests, reduces the need of chemical fertilizers, creates beneficial bacteria, reduces methane emissions from landfills, and lowers your carbon footprint
- How is compost created? What is the process of organic matter turning into compost?
 - Food scraps and other organic material is placed in a compost bin -> microorganisms and bugs work hard to break this material down -> the compost is now ready and can be used to help plants grow -> eventually these plants and plant scraps can be used again to be broken down into compost and the cycle continues!



EXPLORE:

Compost Activity:

Students will participate in an interactive activity where they create their own compost and observe how it breaks down and changes over time.

Materials needed per student:

- 1 Zip-lock bag (any size)
- 1 straw
- Brown material (see Carbon category on image below)
- Green material (see Nitrogen category on image below)
- Soil
- Water

Directions:

- Fill your zip-lock bag with a generous handful of brown material, such as dead leaves, shredded paper, or dead grass.
- Add a small handful of soil and some green material to the bag, such as vegetables, fruits, bread, tea bags, or coffee grounds. Do not use meat, dairy, or fats/oils.
- Add a little water to the bag to make the soil/organic material moist and spongy. Zip up the bag except for one small area near the corner, then stick the straw in the unzipped portion so that the compost has access to air. If you do not have straws on hand, that is ok! Simply just open the bag every few days to let in some air. Now watch the organic matter break down and turn into healthy and nutrient-rich compost! Use this compost to help your garden or add it to a larger compost pile!

The Carbon & Nitrogen Sources for compost chart shows some ideas as to what can be used as brown (Carbon) material and green (Nitrogen) material.

Image from: <https://www.fix.com/blog/how-to-start-a-compost-pile/>

There are many options, so feel free to get creative with what you have on hand! Many of the items that go into the trashcan could be put in the compost instead and be used to nourish plants rather than break down in a landfill and release harmful greenhouse gases. Composting is a very important process that uses many items that would otherwise be thrown away.



Composting is a very important process that uses many items that would otherwise be thrown away. Food waste is a huge issue in the world with 1/3 of all food being wasted and thrown away! By composting, that wasted food can be repurposed and put to good use. When food scraps and organic material breaks down in a landfill, it releases harmful greenhouse gases because there is not enough air for it to breakdown aerobically. When food breaks down anaerobically, methane gas is released, contributing to global warming.



Here is an example of EIS Botany Instructor Natalie Lareau's compost bag. For brown material, she used dead leaves she found under a tree and broken up eggshells. For green material, she used a cut-up banana peel, coffee grounds, and a cut-up pear core.

Discussion:

Over time, through the clear bag, we can see the material begin to decompose! This may take some time but keep on observing regularly to see the changes happen before your eyes! Try to determine which materials are breaking down the fastest and the slowest. Eventually, open the bag and feel the temperature of your compost, you should notice that it is warm. This warmth is a result of all the energy the microorganisms are releasing by breaking down the material in the bag.

Think about how this compost will benefit your garden and the environment. For the environment, some items that would have been thrown away were saved and repurposed. For your garden, all the nutrients that were once in that food are now being put into the plants that are growing. The compost is also now home to many beneficial microorganisms and bugs that can help plants grow and maintain healthy soil.

EXPLAIN:

- Watch videos about compost.
 - Explanation of compost and how it can help the planet:
<https://youtu.be/dRXNo7leky8>

- Explanation of how organic material becomes compost:
<https://youtu.be/cBkBwVFFEWw>
- Review STEAM Vocabulary
 - **Compost:** Decayed material used as a plant fertilizer
 - **Green material:** Nitrogen rich material that is often plant based and was once green at some point. Often it is wet and provides moisture and breaks down quickly.
 - **Brown material:** Carbon rich material that is dry or woody plant material, typically it is brown or has turned brown. Often it is fibrous and breaks down slowly.
 - **Microorganisms:** A microscopic organism, such as bacteria, virus, or fungus, that breaks down organic material and produces carbon dioxide, water, and heat.
 - **Decompose:** To break down and become rotten or decayed
 - **Organic Matter:** Matter composed of organic compounds from the remains of plants and animals and their waste
 - **Aerobic:** Requiring oxygen
 - **Anaerobic:** Requiring an absence of oxygen
 - **Greenhouse gases:** Gases that contribute to the greenhouse effect by trapping energy from the sun
 - **Methane:** A greenhouse gas produced by livestock and landfill. It is a large contributor to climate change.

EVALUATE:

Have students think of how they can reduce their food waste or contribute to a compost pile. Allow them to reevaluate what they typically throw in the trash and think what could be composted instead. Create your own compost pile at home, you can even start with just a small under the sink bin and build from there! Composting is great for the environment, your garden, and your health!

Let us know if you like our lessons and share your compost pictures with us in social media. You can learn more ways to help take care of our environment and celebrate Earth Day Every Day check out all our lessons this week and some past activities like our Ecology lesson "Cool Ways to Recycle" at <https://eisca.org/science-at-home/>.

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