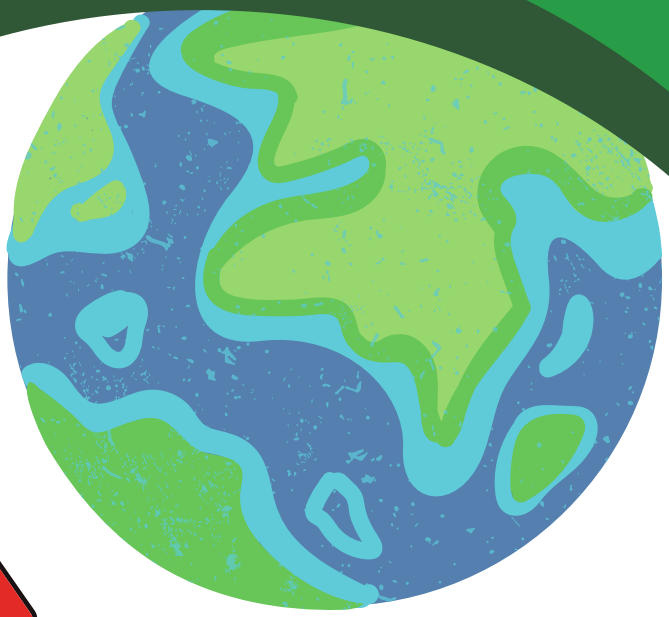
RUTGERS–NEW BRUNSWICK
School of Environmental and Biological Sciences



Lesson Fourteen

Composting, Decomposition and Materials Cycle

USDA NIFA

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Robert Wood Johnson Foundation

Lesson Fourteen

Lesson Overview

In this lesson students investigate the process of decomposition of organic waste, including food waste in the context of the flow of matter and energy through the food system. The focus is on the activity of composting as a solution to the environmental harms of food waste ending up in a landfill, such as contributing to global warming. Students practice determining what items can be decomposed organically or composted, and how to make compost. One of the main takeaways of this lesson is that when food is thrown away in our trash bins, it goes to a landfill, where there aren't the right conditions for the trash to decompose well. The rotting trash in landfills produces a powerful greenhouse gas: methane. Landfills also take up a lot of space. That means we need to cut down forests to make room for all the garbage which then creates methane too. Instead of adding a greenhouse gas to the air to trap more heat and warm the planet further, composting food scraps and other carbon-rich materials actually moves carbon dioxide from the air into soil. Overall, students will learn that composting is an easy and effective way to combat global warming.

Next Generation Science Standards

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Science and Engineering Practices

- For this lesson, students are engaged in the following Science and Engineering Practices:
- Obtaining, Evaluating, and Communicating Information: Obtain and combine information from reliable media to explain phenomena.
- Developing and Using Models: Develop a model to describe phenomena

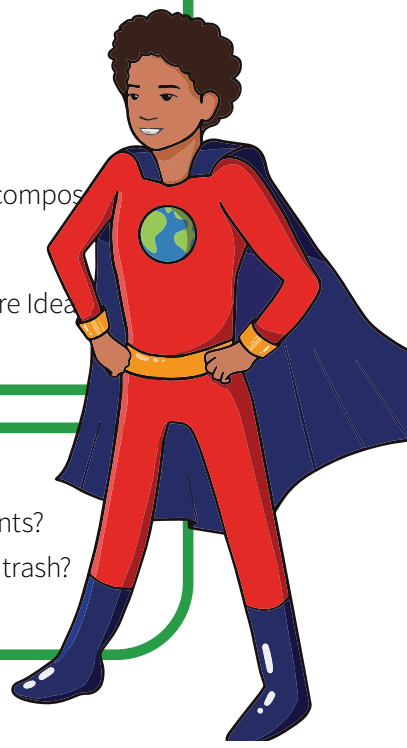
Cross Cutting Concepts

- Systems and System Models
- Matter (e.g., food waste) flows through a system aided by decompos

Disciplinary Core Ideas

In addition, this lesson aligns with the following Disciplinary Core Idea:

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems.



Driving Question(s)

- How can food waste be recycled into the soil where it can nourish new plants?
- What are the benefits of composting food waste instead of throwing it in the trash?
- Which kinds of matter or things can be composted, and which cannot?

Green Italicized words are weblinks for more information.

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Behavior Change Objectives

As a result of the lesson, students will choose to compost some of their food waste and other waste at home or at school instead of throwing compostable materials in the trash to go to a landfill.

Learning Objectives

Students will be able to:

- Describe the movement of matter among plants, animals, decomposers, and the environment.
- Explain how matter (carbon or nutrients) from our food waste can be returned to the soil to nourish new life.
- Identify the benefits of composting food waste instead of throwing it in the trash/sending it to a landfill.
- Distinguish between materials that can be composted (broken down by decomposers) and things that cannot.

Keywords

decomposition | decomposers | methane | carbon | greenhouse gases microorganisms | landfills | compost | vermiculture/vermicompost

Materials

Students will be able to:

- Presentation Slides and Worksheets
- Computer/Chromebook/Technology
- Video: ***youtube.com/watch?v=18d-JW-zw8KA&list=PLKx8NLAujm_nCP-mzHM3eUKiaqMvaH55Zw&index=9***
- Cup of compost or garden soil for each group (optional)
- 2-liter bottles, cleaned and labels removed, with the tops of the bottles cut off (cap off), and push-pin holes made in the bottom. Enough for each student or each group. (optional)
- "Green" materials and "brown" materials for making compost. See fact sheet below for examples of these types of materials. (optional)
- Small bag or one bucket of finished compost or soil (not seed starting or house pant soil) (optional)
- Trays to put the finished composters in on the windowsill (to catch drips) (optional)

Green italicized words are web links for more information.

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Before You Begin

- Review the entire lesson.
- Review eLearning game.
- Review instructions provided for how to construct a windowsill composter for home or classroom.
- Decide if your class will be engaging in the activity of making compost or not. If students will be making compost, review activity instructions and make sure you have all the necessary materials.

Warm Up/Review

As a class, answer the following questions:

- What is food waste?
- What are ways we can reduce food waste?
- Why is food waste bad for the planet?
- How is the distance that your food travels from where its grown or raised to where you eat it or buy it, related or connected to global climate change?

Observable Phenomenon

Decomposing Pumpkin Video, Notice and Wonder.

Students are reminded that on earth, matter and energy cannot be destroyed, they can only change form or be transferred from one thing to another. Begin referring to the compost cycle handout. Give students 1-3 minutes to look over the image before starting the video.

Ask them to keep the image on their desk while the video plays. In addition to the handout of compost cycle, you may also bring in some finished compost for observation.

Then explain that they'll be doing a Notice and Wonder with a video. Play the video embedded in the slides, which is the observable phenomenon for this lesson. It is a time lapse video of a pumpkin decomposing. Students are asked to do a Notice and Wonder, discussing what they observed. You may help by asking:

- What is happening to the pumpkin?
- Where does the matter and energy from the pumpkin go?

Video Lesson

- Watch the video in advance, if possible and observe points that are ideal to pause video and discuss or reflect with the class.
- Play Video embedded in the slides.

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Main In-Class Activity

Making a windowsill composter!
Follow instructions for DIY windowsill composter provided in the handouts.

Alternative Activity (If the DIY project is not feasible.)

In small groups, or as a class, make a list together of all the things that can be composted on the board and then show compost in different stages for students to look at and smell. Using supplied handout, students make a list of everything they can compost from their lunch that is "green" material and any "brown" materials they can add to make the compost work. Teacher helps with ideas when they struggle. Asking, is this (Fill in the blank) item made from plants? Can it be consumed by decomposers?

Review/Reflection Questions

Time permitting, answer the following questions as a class.

- What types of organisms turn food scraps and waste into compost?
- Why should we compost?
  Or how does composting help with climate change?
  Why?
- Where does your trash go if it is not composted?
- What can compost be used for?
- How is composting a type of recycling?
  What is being recycled? (Alt. Where do the carbon and nutrients from the apple end up after the decomposers consume it?)

Exit Ticket

1. In their small groups, students are given 15-20 minutes or more to play eLearning Activity No Food Wasted (embedded in slides). Remind students that they can play these games at home or during free time in class, if permitted. Ask students to discuss their decision making and how they are doing in the game, time permitting.
2. Review Climate and Food Waste Hero Challenge point sheets.
3. Teacher passes out Exit Ticket. The teacher collects exit tickets and reviews student answers.

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Lesson Extension

ELA integration: Writing about what we learned:

Option 1: Compare and Contrast Science writing: Use the information obtained from the two videos and the handout to write two paragraphs comparing and contrasting different methods for disposing of food waste: throwing it in the trash (sending to landfill) and composting. Students can use the hand out provided to help them think through the different factors (such as one how much space it take us, how easy it is to do, and harmful it is to the environment) to get them started.

Option 2: Persuasive Science-based writing:

Using the information obtained from the two videos and the handout to write a letter to the school principal or administrators (names provided by teacher) trying to persuade them to allow them to create a school composting program.

Why should the school compost?
How can they implement it?
How does composting work?
What are the benefits for the school?
For the environment?

Option 3: Play Greenhouse Gas Reduction eLearning Game (embedded in slides)

Option 4: ***Worm Bin: 100-Day Time-Lapse | New Jersey Climate*** from Education Hub (njclimateeducation.org)

Resources

- ***Rutgers University Fact Sheet on Home Composting*** (For Parents and Kids).
- Additional Composting and Climate Change Video: ***youtu.be/qHYzRaepeMw***

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