

ROT THIS WAY

Composting Turns Waste into Wonder

Jennifer DeBruyn, Professor, Biosystems Engineering and Soil Science



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Skill Level

Intermediate (6th-8th Graders)

State Standards Addressed

5-LS2-1

MS-LS2-5

Learner Outcomes

The learner will be able to:

- Describe what composting is and the five essential ingredients needed
- Explain some benefits of composting
- Understand what types of food wastes are compostable
- Construct a compost pile

Tag(s)

4-H Science

Time Needed

30 minutes in class

Weeks to months if setting up a compost pile

Materials Needed

Compost container: Could be a large composter in the back yard, a 5-gallon bucket or large jars

Greens – food scraps, green leaves

Browns – dried leaves, woody materials, paper

Soil (if using a bucket)

Water

Optional:

Non-biodegradable items

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Adapted from: “Do the Rot Thing: A Teacher’s Guide to Compost Activities”

cvswmd.org/uploads/6/1/2/6/6126179/do_the_rot_thing_cvswmd1.pdf

Introduction to Content

This lesson covers the basics of composting: what it is and the essential ingredients for building a compost pile.

Introduction to Methodology

After learning about the compost process and the essential ingredients through a sorting game, students may help build their own compost pile. This could be done at any scale: outdoors in a compost pile, a 5-gallon bucket or in large jars. Alternatively, students can design a model of a compost pile using pictures of items.

Terms/Concepts

Composting – A controlled process where organisms break down organic materials like leaves and food waste

Compost – A nutrient-rich organic material that can be used as a soil amendment

Decomposer – An organism that breaks down dead organic matter



Setting the Stage/Opening Question

Ask: "Where does our food come from?"

Since many students may answer "grocery store" or "restaurant," encourage them to think further. All our food comes from the earth – we grow plants in soil, animals eat the plants and we eat the plants and animals.

Ask: "Where does our food waste go?"

Much of our food waste goes in the garbage, which ends up in a landfill. But that food waste still has lots of good nutrition in it for the earth and plants.

Ask: "What happens if we drop a banana peel in the woods?"

In nature, **decomposers** would recycle organic waste to release nutrients for plants to grow. We mimic nature by **composting**, which is a controlled process where bacteria, fungi and other organisms break down organic materials into a nutrient rich product called "**compost**" that can be added back to soil. Show the students finished compost if available.

Ask: "What are some benefits of composting?"

Composting keeps food out of the landfill, creates more topsoil, adds nutrients for plants, adds soil organisms and improves soil's ability to hold water.

Explain that there are FIVE ESSENTIAL INGREDIENTS for building a compost pile:

1. **"Greens"** – Moist fruit and vegetable scraps, green leaves and fresh manure. These are items that are rich in nitrogen. (Note that while dairy and meat are biodegradable, we don't add them to backyard compost piles because they attract scavengers).
2. **"Browns"** – Dry and woody plant trimmings such as dried leaves, straw, wood chips and twigs.
3. **Decomposers** – Bacteria, fungi, worms and arthropods that breakdown and eat the waste for energy. If we build a compost pile outside, these decomposers will naturally find their way in. If we compost in a bucket or closed system, we can introduce them by including some soil or old compost which contains these decomposers.
4. **Air** – Decomposers need oxygen, so we keep the pile aerated by turning or mixing.
5. **Water** – Decomposers need water, but not so much that it gets saturated and limits the oxygen! The materials should feel like a wrung-out sponge, i.e. damp, but not soggy.

Strategies to Increase Student Engagement

WATCH: SciShow Kids

"Make the Most of Compost"

youtu.be/Q5s4n9r-JGU?si=LSmkADc87uq7oUwK

For more composting activities, see **"Do the Rot Thing"**

cvswmd.org/uploads/6/1/2/6/6126179/do_the_rot_thing_cvswmd1.pdf

Experience

Part 1. What goes in compost?

1. In advance: Print off the composting item flash cards OR bring in real examples of these items.
2. Ask students to think about what can and cannot be composted. Review the concept of “biodegradable” if needed.
3. Split students into small teams. Label three areas of a table as “compostable greens,” “compostable browns” and “does not go in compost.”
4. Give each team a stack of food waste flash cards. Have them sort the items into the three categories.
5. When complete, review what the students included in each category:
 - a. The “greens” should include “fresh” organic matter – fruits and vegetables, coffee grounds, eggshells, leaves, paper, pet waste – things that will break down quickly
 - b. The “browns” should include things that break down slowly – hay, twigs, wood chips, cardboard
 - c. The “does not go in compost” category should include things that are not biodegradable (plastics) or items that could attract scavengers (meat and dairy). This category may also include invasive plants, whose seeds could survive and then grow in your garden later.

Part 2. Build your compost pile

1. Cut materials into small pieces (6 inches or less)
2. Layer browns and greens. If composting in a closed system (bucket or jar), add a layer or two of soil or old compost to introduced decomposer organisms.
3. Add water until the pile is as wet as a wrung-out sponge.
4. Every few days, the pile should be mixed or aerated.

Extensions and Variations

- Monitor the temperature of the pile. In large piles, the heat of the decomposer activity is enough to raise the temperature of the pile. In a smaller bucket or jar, there is more surface area so the heating from decomposition may not be enough to overcome heat loss to the outside.
- Bury degradable and non-degradable items (e.g., paper vs. plastic straws) in the compost and make predictions about what will happen to the objects over time.
- Have students make a list of everything they throw away in a day. Have them track which of these items are compostable.

Share

Ask, “Why do we need to mix ‘greens’ and ‘browns?’”

Process

Ask, “What are the five essential ingredients for composting? Why is each essential?”

Generalize

Ask, “Why is it important to convert our food waste back to soil?”

Apply

Ask, “How does putting more of our food waste into the compost benefit the environment?”

Notes

Supplemental Information

Educational Standards Met

5-LS2-1. Ecosystems: Interactions, Energy, and Dynamics. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.]

MS-LS2-5. Ecosystems: Interactions, Energy, and Dynamics. Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

TIPPS ***Life Skills***

- Head - Thinking
- Health - Living

STUDENT WORKSHEET

Name: _____ Date: _____

1. Sort the waste items below into the right category:

- Banana Peels

Meat

Cardboard

Hay

Paper straw

Potato peels
- Coffee grounds

Fresh leaves

Vegetable scraps

Twigs

Plastic straw

Wood chips
- Newspaper

Dried leaves

Egg Shells

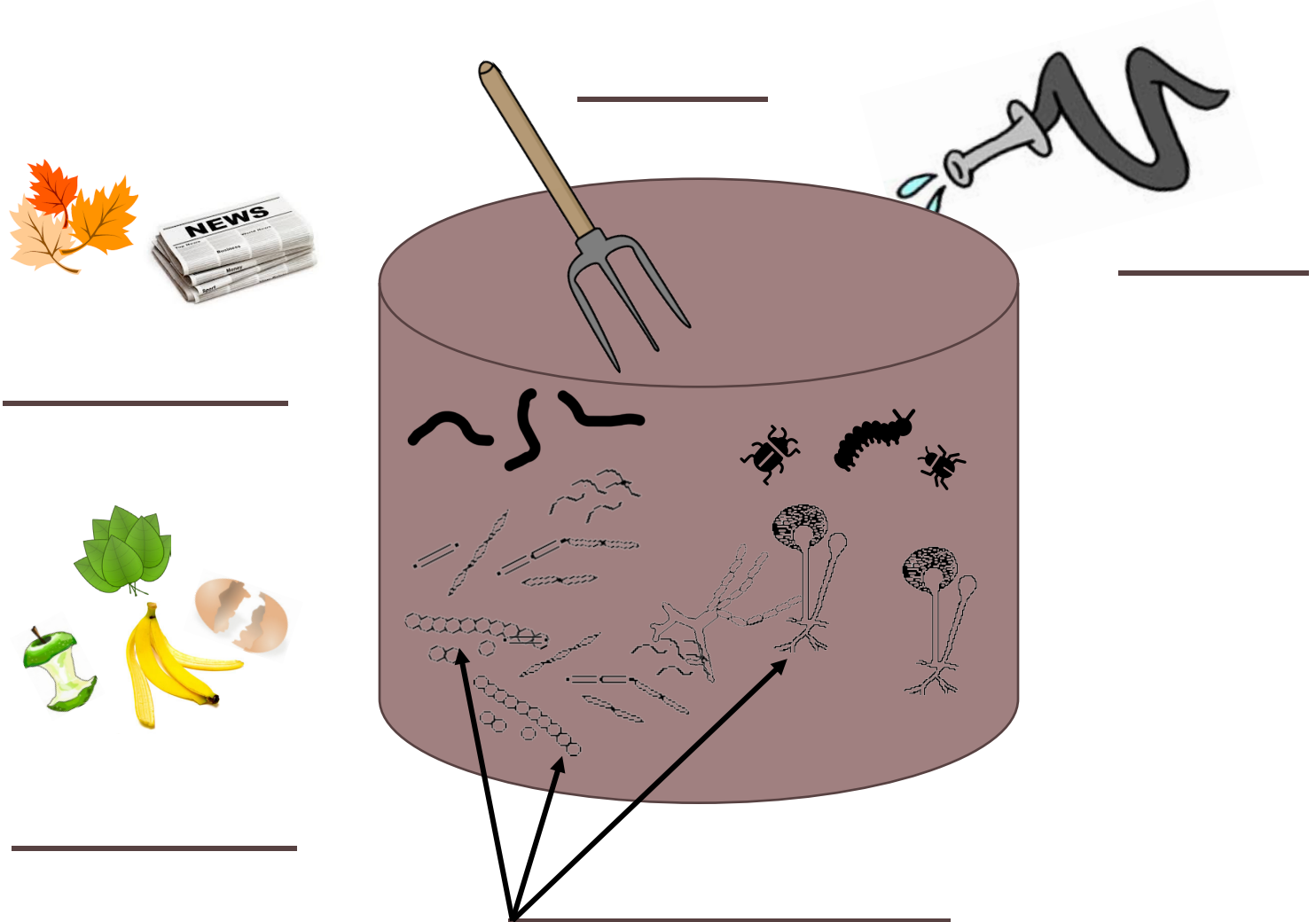
Apple core

Dairy products

Plastic fork

Compostable		Not Compostable
"Greens"	"Browns"	

2. Label the FIVE essential ingredients for composting:



3. Why do we need to mix “greens” and “browns?”

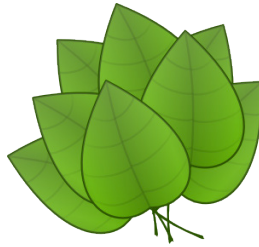
4. Why is it important to convert our food waste back to soil?

5. How does putting more of our food waste into the compost benefit the environment?

WHAT GOES IN COMPOST FLASHCARDS



Coffee grounds



Fresh Leaves



Dry Leaves



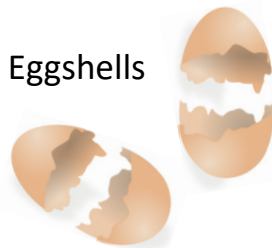
Hay



Newspaper



Cardboard



Eggshells



Banana Peels



Lettuce / Cabbage



Apple core



Avocado



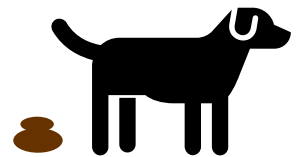
Pumpkin



Plastic bottle



Plastic cutlery



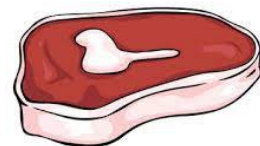
Pet waste



Plastic straws



Invasive plants



Meat



Dairy Products



Twigs and branches



Wood chips



Paper straws



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