

4-6 MODULE

Unit 3: Composting

Overview

UNIT 3'S CONCEPT

Organic waste can be recycled through composting to enrich soil and save space in landfills.

The five lessons in this unit are described in the outline that follows.

LESSON 1: THE NUTRIENT CYCLE AND OTHER CYCLES

Lesson's concepts:

- "... all organisms create waste through the use of natural resources, and that waste is cycled through natural systems." ("Conceptual Matrix for Integrated Waste Management Education")
- Materials in nature, such as nutrients, are recycled.

In Lesson 1 students will:

- Discuss what happens to leaves in natural environments and in urban environments.
- Observe plants' life cycles on the school grounds and/or in pictures.
- Read or listen to the story, *The Fall of Freddie the Leaf* by Leo Buscaglia, and conclude that leaves decompose after falling on the ground and become part of the soil that will provide nutrients to the tree from which they fell.
- Collect leaves in various stages of decomposition and/or conduct an experiment by placing some leaves on top of the soil and burying some leaves to observe and compare the rates of decomposition.
- Identify examples of cycles on the school grounds.
- Read a book about the life cycle of a tree and identify the parts that describe the nutrient cycle.

LESSON 2: SCAVENGERS AND DECOMPOSERS

Lesson's concept: Scavengers and decomposers are essential to the recycling of organic matter.

In Lesson 2 students will:

- Observe evidence of decomposition.
- Locate some scavengers on the school grounds.
- Make a mural of the scavengers they observed.
- Design a habitat in a container for a specific scavenger, collect several scavengers from the school grounds, keep them for observation for 24 hours, and then release them.
- Conduct research, using reference books on a specific scavenger.
- Grow and compare colonies of decomposers, such as molds, yeast, and bacteria.
- Play a game to identify specific scavengers and decomposers.

LESSON 3: WHAT DECOMPOSES?

Lesson's concept: Most organic materials decompose through the actions of decomposers.

In Lesson 3 students will:

- Bury several objects to test them for their tendency to decompose.
- Observe things on the school grounds that are decomposing.
- Collect litter from the school grounds and identify any packaging materials or bring used packaging material from home.
- Separate packaging materials into those that will decompose and those that will not decompose and test different hypotheses by burying small pieces of different packaging materials.
- Relate how the natural recycling process that gets rid of waste (through decomposition) can be used to lower the amount of waste that goes into landfills.

- Write a story with a “fortunately/unfortunately” format about packaging materials made from organic or inorganic materials.

LESSON 4: WHAT IS COMPOSTING AND WHY IS IT IMPORTANT?

Lesson’s concepts:

- Composting is a way of recycling organic matter that might otherwise be sent to a landfill.
- Composting reduces the volume of organic waste and saves landfill space; the compost can be used to improve a soil’s structure and fertility.

In Lesson 4 students will:

- Conduct experiments to identify the five essential components in the production of compost.
- Identify materials that can be composted and those that should not be composted.
- Classify materials that are considered green organic matter and brown organic matter to use in a compost pile.
- Use two-liter beverage containers to simulate the conditions of a landfill and of a compost pile and compare the decomposition rates of organic materials in both containers.
- Connect the action of composting to reducing the amount of waste that is sent to a landfill.
- Apply what they have learned by writing about composting.

LESSON 5: PROMO AND PLAY ON COMPOSTING

Lesson’s concept: People can reduce the volume of household solid waste that goes to landfills by composting organic waste and then using the compost to enrich soil.

In Lesson 5 students will:

- Complete a project on some aspect of composting to make others aware of the importance of composting.
- Write, rehearse, and perform a play, “By the Skins of Our Bananas,” to encourage people to divert their food waste through composting.

Required Books to Implement Unit 3

• For Lesson 1

- Buscaglia, Leo. *The Fall of Freddie the Leaf: A Story of Life for All Ages*. Thorofare, N.J.: Slack Incorporated, 1982.
- Donahue, Mike. *The Grandpa Tree*. Boulder, Colo.: Roberts Rinehart, 1988.

Recommended Books

• For Lesson 1

- Pfeffer, Wendy. *A Log’s Life*. Illustrated by Robin Brickman. New York: Simon & Schuster Books for Young Readers, 1997.
- Tresselt, Alvin. *The Gift of the Tree*. Illustrated by Henri Sorensen. New York: Lothrop, Lee & Shepard Books, 1992.

• For Lesson 2

- May, John, and Jocelyn Stevenson. *The Magic School Bus Meets the Rot Squad: A Book About Decomposition*. New York: Scholastic, Inc., 1995.

PROJECTS

Projects provide experiences in service learning and project-based learning to students and allow them to apply what they have learned in the classroom. The following describe projects and examples of schools that have accomplished projects that address this unit on composting. Teachers are encouraged to select one of these projects to implement or to have their students develop one of their own. If students implement an applicable project, they and their teachers are encouraged to send a description of the project to the California Integrated Waste Management Board, Office of Integrated Education.

- **Project 1:** Students plant seeds from various species of plants outdoors in a planter or in the school’s garden to observe the life cycle of the plants. Every week students measure and record plant growth, describe weather conditions for the week, and illustrate the life stages of each plant. They determine the average length of time of the life cycle for each species

planted. They present their data in a chart form and write a conclusion to their observations. (Lesson 1)

- **Project 2:** Students conduct research on what type of composting activities could work at school. They could also consider vermicomposting. Students plan and implement a composting program. (Lesson 4)

Good Shepherd Catholic School, Pacifica¹

The fifth-grade class at Good Shepherd decreased the amount of food waste going to the landfill through vermicomposting. Groups of students put out collection buckets for food scraps and added them to the worm compost bins after each lunch period. The vermicompost was used to start a school garden.

Rooftop Elementary School, San Francisco Unified School District²

Having a well-established garden at Rooftop Elementary School allowed both worm and basic composting to be integrated easily. The school now has three 4- by 4- by 2-foot worm bins for fruit and vegetable scraps and several basic composting bins for garden trimmings. The students eat in the school garden, making collection easy. An average of 15–20 pounds of food waste is collected each week. The worm castings and basic compost are used in the garden.

¹“Jiminy Cricket’s Environmental Heroes 1994–97.” Burbank, Calif.: The Walt Disney Company and the State of California’s Environmental Education Interagency Network, 1999, p. 17.

²Information provided by Natasha Stillman, School Education Coordinator, Solid Waste Management Program, City and County of San Francisco.



Vermicomposting bins at Rooftop Elementary School, San Francisco Unified School District.



The composting and vermicomposting bins at Lawton Elementary School, San Francisco Unified School District.

- **Project 3:** Students develop a composting plan for the school. The class develops a test to see whether students are disposing food waste properly. (Lesson 5)

Note: Lesson 5 focuses on students conducting a project. A list of projects is provided in that lesson. Students also write and perform a play.

- **Other projects:**

John Muir Elementary School, San Francisco Unified School District³

At John Muir Elementary School a fifteen-student “Worm Patrol” team collects food waste from one of the lunch periods. The food is then distributed between a worm bin and a basic composting bin. The worm castings and compost from the basic composting bin are both used as fertilizer and soil amendment in the school’s garden, located a half-block away from the school. The garden is used each week by the garden coordinator to teach lessons on gardening and composting to students.

Lawton Elementary School, San Francisco Unified School District⁴

The composting program at Lawton includes two 4- by 4-foot worm bins for vermicomposting and two Smith and Hawken Biostacks for composting. Teams of six students in grades 3–8 rotate over a two week period to monitor the process, collect food, and feed the worm bins. In the 1996–97 school year, an average of 49 pounds of material was composted every week. The compost is used in the school’s garden and in the landscaping of the school.

³Ibid.

⁴Ibid.

Valley Springs Elementary School, Calaveras Unified School District⁴

Students at Valley Springs Elementary School recruited the help of parents and local businesses to create a garden in a vacant lot across the street from their school. A composting program was initiated and the compost is being used to enhance the soil in the garden.

Cesar Chavez Elementary School, San Francisco Unified School District⁵

In 1996 a composting program at Cesar Chavez Elementary School was initiated by three teachers as an addition to the garden that was already in place. In 1997 an Americorps volunteer associated with the school took over the project. The school now has seven worm bins, five of which were cut down to accommodate the smaller children. An average of 5–10 pounds of compostable food is collected every week. The worm castings are used as fertilizer in the school's garden.

⁴“Jiminy Cricket’s Environmental Heroes 1994–97.” Burbank, Calif.: The Walt Disney Company, Inc., and the State of California’s Environmental Education Interagency Network, 1999, p. 25.

⁵Information provided by Natasha Stillman, School Education Coordinator, Solid Waste Management Program, City and County of San Francisco.



Each class at Cesar Chavez Elementary School (San Francisco Unified School District) has a garden area.



The composting and garden area at Laytonville Elementary School, Laytonville Unified School District.

Laytonville Elementary School, Laytonville Unified School District⁶

Putting worms to work has made vermicomposting (composting with worms) successful at the Laytonville Unified School District in Mendocino County. Students from the district’s elementary and middle school separate their lunch waste into nonprotein “worm food” (i.e., no meat or dairy products), paper bags, aluminum cans, glass, milk cartons, and garbage. Both the worm food and paper bags (after being shredded) are taken to the worm bins located in the school garden. Under adult supervision, middle school students monitor the bins and record the worms’ activities. Students also built four 32-square foot worm bins last spring out of redwood and plywood. A chart showing the amount of compost produced is posted in the cafeteria; the compost and recycling program has reduced school garbage by 60–80 percent.

⁶“Laytonville Composts,” *Reusable School News*. Sacramento: California Integrated Waste Management Board (spring 1993).