

Bay Area Scientists in Schools Presentation Plan

Lesson Name Worm compost: turning waste into soil

Presenter(s) Steven Hall

Grade Level 4th Standards Connection(s) 4-LS: Decomposers recycle matter from dead plants and animals (includes many microorganisms, fungi, and insects). Ecosystems include both living and non-living components (organisms, soils, climates, etc)

Teaser: We will study red wiggler worms and learn how they can transform food scraps into plant food.

Vocabulary/Definitions:

3 – 6 important (new) words

- **Decompose:** Break down dead plants into smaller pieces
- **Microbes:** microscopic organisms that decompose dead plants and animals
- **Red wiggler worms:** worms often used to speed-up the decomposition process
- **Compost:** Rich new soil produced from plant waste by microbes and worms
- **Nutrients:** Chemical substances that plants and animals need to live and grow

Materials:

What will you bring with you?

- Worms
- paper plates
- compost
- food scraps
- scale

What should students have ready (pencils, paper, scissors)?

Pencils, paper

Classroom Set-up:

Student grouping, Power/Water, A/V, Light/Dark, set-up/clean-up time needed

Students should be divided into groups of ~4 students to examine worms and compost



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Classroom Visit

1. Personal Introduction:

5 Minutes

Who are you? What do you want to share with students and why? How will you connect this with students' interests and experiences?

My name is Steven. I'm a graduate student scientist at UC Berkeley, and I study the biology and chemistry of soil. In particular, I study how dead plants are broken down and transformed by microbes and animals (like worms) that live in soil. Who knows what a microbe is? Can anyone guess how many microbes live in a handful of soil? Why might microbes that decompose plants be important for human beings? Does anyone have a garden at home? Who likes to eat fruits and vegetables? Then decomposing microbes and worms are your friends...

Topic Introduction:

5 Minutes

What questions will you ask to learn from students? Big Idea(s), vocabulary, assessing prior knowledge...

What happens to food waste when you are done eating (landfill vs. compost)? Landfills are holes in the ground where garbage remains for a very long time. Who knows what composting is? Why is it better than landfilling? Today we will study how worms can speed-up decomposition and produce compost. What do worms like to eat (anything that comes from plants, including paper products)? What happens after worms eat, and what do they produce (compost)? What can we use compost for (nutrients to grow plants)?

2. Learning Experience(s):

35 Minutes

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion writing, measuring... Describe in order, including instructions to kids.

Draw anatomy of a worm—I will draw a diagram on the board, and students can draw their own on paper (5 min). Review requirements for worm survival: food, water, shelter, air

Hand out worms and compost to student groups. Let them handle or observe worms for five minutes. Encourage them to write down any questions about the worm behaviors that they observe. What are the worms doing? Separate a worm from the compost. How does the worm react? How do the worms respond to sunlight or moisture?

Discuss student questions about worm behavior (10 min)



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Weigh a few worms on the scale. Ask how much food they think a worm can eat (worms can consume their own weight in food every day!). Do some example calculations to show how much food a worm can eat in a day, month, year.

Next, I will show students a number of food waste items, and ask them whether these should be (a) composted, (b) recycled, (c) disposed as garbage. I will remind students that most waste that comes from plants, including paper, can be composted by worms and microbes (5 min)

3. Wrap-up: Sharing Experiences

5 Minutes

Putting the pieces together – how will students share learning, interpret experience, build vocabulary?

Review the vocabulary words. What is composting? How do worms help decomposition? Why is compost useful for plants? What do worms like, and what do they need to survive?

4. Connections & Close: *What else might kids relate this to from their real-life experience? How can they learn more? Thanks good-bye! Clean-up.*

Are you interested in composting at home? Hand out information sheets. Offer to leave a miniature worm-bin with the teacher so the class can follow the decomposition process over time.

Total 50 – 60 Minutes

Follow-up – After Presentation

Suggest students write a letter explaining “How we learned about worms and composting?”

Compost: A Scientific Investigation (California Academy of Sciences) – In this activity, learners conduct a scientific investigation involving decomposition and discover that the life cycle of trash is affected by its organic or inorganic nature. Learners develop questions, hypothesize, and record observations in compost workbooks throughout the seven-week experiment. This detailed lesson guide includes key vocabulary, background information, wrap-up and extension ideas, and resources. <http://www.calacademy.org/teachers/resources/lessons/composting-a-scientific-investigation/>



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Garbology – Composting Bioreactor (Center of Science and Industry) - In this activity (page 19 of the PDF) learners will create a soda bottle bioreactor by exploring the science of composting, comparing variables such as reactor design, moisture content, and nutrient ratios of mixtures to be composted. This was created as a post-visit activity for a workshop about garbage and recycling, but is also makes an excellent stand-alone activity. <http://smile.cosi.org/garbology-teacher-packet-and-classroom-activities.pdf#page=19>

Reading Connections:

- Compost Critters by Biana Lavies – Close-up, enlarged photographs follow Lavies’s compost pile through an entire year while the “compost critters” go to work. They recycle her unwanted waste into rich garden soil called humus. Instructions for making your own compost pile are included. <http://www.amazon.com/Compost-Critters-Bianca-Lavies/dp/0525447636>
- I Want to Be an Environmentalist by Stephanie Maze and Catherine O’Neil Grace – Describes career opportunities within the field of environmentalism and suggests ways to pursue such a career. http://books.google.com/books/about/I_Want_to_Be_an_Environmentalist.html?id=vs1TPgAACAAJ



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