



# Compost Critters

A lesson on compost ecosystems from:



This lesson meets the following Next Generation Science Standards:

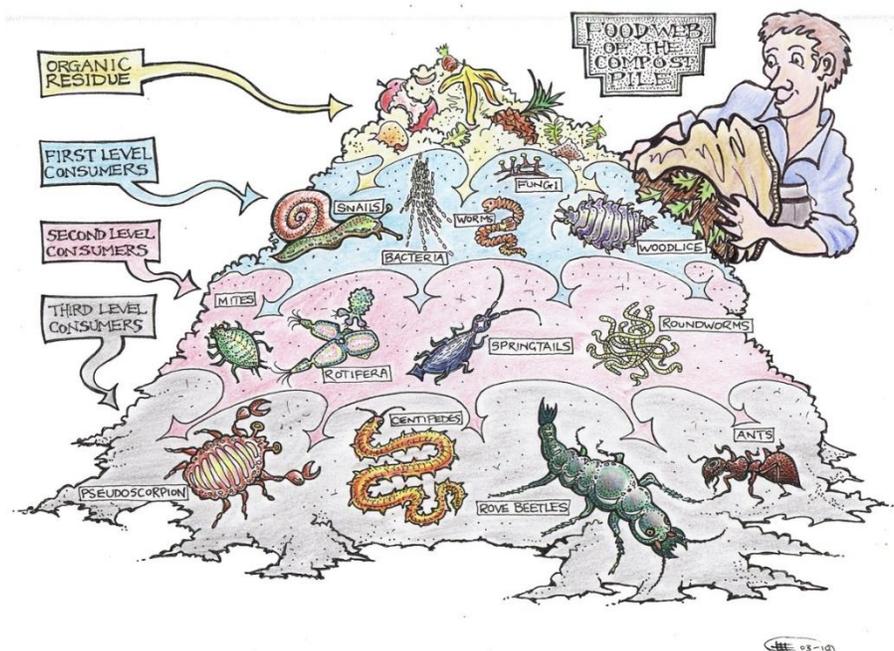
Life Science Standards for Fourth Grade:

Cross Cutting Concept: “A system can be described in terms of its components and their interactions.”

California’s Environmental Principles and Concepts:

EP&C 2: People influence natural systems

EP&C 3: Natural systems change in ways that people benefit from and can influence





# Summary

This lesson uses the process of decomposition in compost piles to help students explore the interconnectedness of ecosystems and the role of producers and consumers in food chains.

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Web: A game to have the students take on the role of consumers in a compost pile and think about how insecticides affect ecosystems

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## Mold, Mites, Nematodes: Compost Critters and the Complex Food Web

### Supplies:

1. Compost cards (See separate attachment of compost cards)
2. Whiteboard or other space for keeping score

### Time:

5-20 minutes (*You can keep this game going as long as you'd like. Once the students know the rules, each round only takes about 1 minute.*)

### Objectives:

This game simulates the compost food web, helping students explore the NGSS Crosscutting concept for Life Sciences grade four that “A system can be described in terms of its components and their interactions.” Students can begin to appreciate that within a tiny patch of compost, there is an amazing array of biodiversity and a delicate balance of species that interact to produce compost. Through game play, the students start to see that compost ecosystems need critters on all levels of the food web to keep things running smoothly, and they see how insecticides can have a damaging effect by wiping out whole levels of the food web. By everything looking out for its own survival, it also ensures the survival of animals further up the compost web.

### Set-up:

Cards should be given out first:second:third-level consumers in an approximate ratio of 4:2:1. There should be one insecticide card for each third-level consumer in game play. It is not necessary to get the numbers perfect, as different ratios will lead to different outcomes. The main point is that there should be far many more first level consumers than any other level, and the fewest third-level consumers. Before beginning, you may choose to write on the board how many first, second, and third-level consumers and insecticide cards the game is starting with.





### Game Play:

Tell the class that they are going to play a game similar to rock-paper-scissors, but they will each be a critter in the compost food web. Allow students to read the back of their card to learn about their critter. They should identify, but not tell others, whether they have a first, second, or third level consumer, or an insecticide card.

To start a round, the students should choose a person at random to partner up with. The class will all say “Mold, Mites, Nematodes” and then show their cards to their partners.

Third-level consumers eat all first and second-level consumers. Second-level consumers eat first-level consumers. The poor first-level consumers do not eat anyone, but the good news is that there are many more first-level consumers than any other level, so these players have a good chance of not getting eaten! Only third-level consumers get killed by the insecticide card.

If a player is eaten, they go to a designated time out space. They do not participate in further rounds unless someone brings them back into the game. If two of the same level consumers find one another in a round, they can bring someone of that same level back into the game. For example, if two second-level consumers find one another, they can bring a second-level consumer back into the game. However, if there is no player of the same level to bring back in, then that level is said to be *overpopulated*, and both players must enter time-out.

### Scoring:

After each round, tally up the numbers of each level in the game. You don’t want the students to know who is who, and so you can do this one of two ways. 1. Have the students close their eyes, and ask one level at a time to raise their hands, as you take the tally on the board. 2. Students may enjoy the experience of being multiple critters. You may have them all hand their cards in to you, and pass them back out, with the exception of those who are in time-out who should remain the same critters.

If there are no more consumers of a certain level at the end of the round, it is a good time to have students guess what might happen. If you want to speed up the game, you can secretly swap first or second level players with insecticide cards. If the game wraps up before any levels are wiped out, you can congratulate them for keeping a balanced compost food web. You may want to take some time after the activity to have the students reflect on the game with the questions below, or your own questions.

*Possible extension: Have the students create graph of the population changes across rounds*

### Reflection Questions:

- Looking at the tally sheet, how did the different levels change over the different rounds?
- For a food web to be balanced, should there be the same number of all levels of consumers? Why or why not?
- What happens when one level of the food web is over-populated?
- What happens when one level of the food web is wiped out?
- Why are insecticides harmful to the compost food web?
- What might it mean to say that a food web is sustainable?
- As people, how can we help food webs to be sustainable?



## Feed the Worms!



Corey, Plant Healthcare Specialist at Lotusland, nurtures the soil ecosystem by composting and using organic sprays

A healthy soil ecosystem is necessary for healthy plants. For a soil ecosystem to be healthy, it should have a wide range of critters on all levels of the food chain. To keep our soil, plants, and animals healthy at Lotusland, all materials in our gardens are **organic**. This means we do not spray artificial poisons to kill insects, pests, or weeds, as these poisons also hurt the ecosystem.

Instead, we have a **sustainable** garden system. We try to mimic natural ecosystems in which **biodiversity** and the recycling of energy keeps the system going! Nature knows best! We like to feed our worms and other compost critters so they can turn our organic waste into powerful nutrients that help our plants grow strong!

Lotusland sprays many of our plants with what we call “**compost tea**.” To make it, compost is mixed with water, and sometimes extra nutrients like kelp or fish. The extract contains as much as 80% of the **beneficial organisms** (bacteria, fungi, protozoa and nematodes) that healthy soil should have. Benefits of compost tea include:

- Disease-causing **microorganisms** are out-competed or consumed by the beneficial organisms.
- Biodiverse microorganisms turn material into compost more quickly.
- Toxic materials are broken down more quickly.

Soil is alive with living organisms and supports all of life on earth! We hope that you will help us take care of the soil by composting!



Name \_\_\_\_\_

### Reflection Questions:

1. Use clues from the reading to figure out what the words in bold might mean?

**Organic:**

**Sustainable:**

**Biodiversity:**

**Compost tea:**

**Beneficial organisms:**

**Microorganisms:**

2. Compostable items include plant-based food waste, egg shells, coffee grounds, paper products that are not coated in wax, and flowers. What things do you use at home that could be composted instead of thrown into a landfill?