



Food Pyramids and Pesticides

Lesson Description

Students model a food pyramid. Students are introduced to the difference between organic and conventional farming methods. They investigate the potentially poisonous effects of pesticides on all members of a food chain illustrating the interdependence within food chains: When something is changed at one level, it will have an unknown impact at another level.

- Time required: 60 minutes
- Location of lesson: Classroom

Learning Objectives

- Describe the difference between organic and conventional farming methods.
- Explain how the interconnected nature of a food chain can be affected by pesticides.
- Describe a food pyramid.

Materials and Preparation

- 8 plastic, beaded necklaces
- Optional activity “Read aloud”
 - The Desert is Theirs, book by Byrd Baylor
- Optional activity “Salty Celery”
 - 4 celery sticks
 - 2 large cups or jars
 - Salt
 - Water
 - Preparation: Fill 1 jar with very salty water, fill the other jar with plain water. Soak 2 celery sticks in the salt water and 2 celery sticks in the plain water overnight.
-  **Pass it Up the Line**
- Prepared vegetable snack of the week – 1 for each student
- Water to drink during the Class Warm-up – water dispenser in the classroom and 1 cup or a water bottle for each student

Class Warm-up: Champion Cheer and Veggie Taste Test (5-10 minutes)

- Give each student a cup of water or ensure that they have a filled water bottle in front of them.
- Give each student the prepared veggie snack of the day.
- Lead the students in enthusiastically reciting the  **Champion Cheer**.
- At the end of the cheer, drink water and eat the veggie snack together.

- Have students complete their  **Taste Test Observations** about the vegetable snack of the week.

Review of Last Lesson (2-3 minutes)

- Review the evaluation questions from last week's lesson. Evaluation questions from all lessons are listed at the end of the workbook .

Class Discussion (10 minutes)

Food Pyramids

Let's review - what is a food chain? (Answer: the connections between living things or the transfer of energy from one living thing to another) Today we will see how food chains are actually better represented as food pyramids. A food pyramid is a food chain that shows the amounts of organisms at each level. For example, the consumers at the top of the food chain (a bear) need to eat more of the consumers of the previous level in a food chain (the bear needs to eat 2 salmon, the salmon need to eat many more than 2 minnows and aquatic insects, etc.).

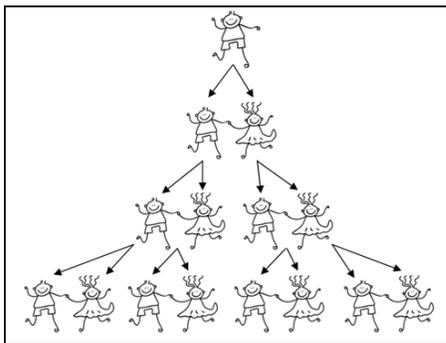
Organic vs. Conventional Farming and the effects of pesticides

What does "organic" mean when talking about gardening and farming? Organic means crops are grown without the use of chemical fertilizers or pesticides. It also means that the organic farmer or gardener uses natural, sustainable methods and takes care to respect the natural environment. Our garden is organic. This means we don't use any synthetic chemical pesticides to kill pests. Conventional farmers sometimes spray crops with chemical pesticides to kill pests. But in large amounts, pesticides can have unknown and possibly harmful effects on everything in the food chain.

Activities (40 minutes)

-  **"The Hungry Eagle Food Pyramid" (15 minutes):** Students model a food pyramid to illustrate how large numbers of organisms are needed at the bottom of the food pyramid to support fewer numbers of organisms at the top.

1. Refer students to their workbook page  **Pass it Up the Line.**
2. Together as a class, brainstorm a list of plants and animals to build a food chain with an eagle as the top consumer. Write the list on the board as you go. Start with an eagle, *what does an eagle eat?* (lizards, mice rabbits snake, etc.) *What do those animals eat?* (bugs, grass, fish, etc.) *What do those animals eat?* (plants, bugs, energy from the sun, etc.)
3. Ask for 1 student volunteer to come to the front of the room and be the eagle. Ask the student what he or she would like to eat (lizards, mice, rabbits snake, etc.). *As a big, hungry eagle, you would need to eat more than*



one of those animals to have enough energy. Select 2 more student volunteers to represent this level of the food chain.

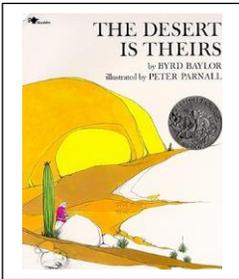
- a. Repeat this process. Ask the second-level students what food they would like to eat (bugs, grass, fish, etc.). *You will need more than 2 bugs.* Select 4 students to represent this level of the food chain. Continue for one more level.

4. Ask students to complete the  **Pass it Up the Line** page in their workbook with the examples used in class individually, or complete it together as a group.

- **“Pesticides in the Food Pyramid” (15 minutes):** Students model the effects of bioaccumulation through the food pyramid.
 1. Have students line up in the food pyramid formation from the previous activity. Ask for one additional student to be the crop duster and pretend to “spray” the bottom level of the pyramid with pesticide by giving them a plastic beaded necklace.
 2. Ask each student standing in the second level to simulate “eating” the first level plants and take their necklaces. Some of the second level students will now have 2 necklaces, signifying the passage of the spray from one organism to another.
 3. Each student in the third row of consumers then “eats” the second level consumers and takes their necklaces.
 - a. Continue until the eagle at the top of the pyramid has all the necklaces.
 4. Discuss: *What do the eagle’s necklaces represent? How did the eagle get all of the necklaces? (the pesticide was in its prey). How can a change in one part of the food chain affect another part? Do we always know the impact of our actions?*
- **Optional Activity: “Salty Celery” (10 minutes):** A salt water and celery experiment that illustrates the way soil and crops are affected by what we put on them.
 1. *Soil absorbs the substances that are put onto or into it and passes them to the plants that grow in the soil. It is important to keep the soil healthy and avoid contaminating it with chemicals in conventional pesticides and herbicides.*
 2. Show the students the celery soaking in plain water and the celery soaking in salt water. *The salt signifies a chemical contaminant such as a pesticide.*
 - a. Ask for a student volunteer to taste the plain water celery and the salt water celery. Ask the student to describe to the class the difference in the celery.

- b. Discuss: *Where is the salt flavor coming from? Did the celery absorb the salt, which signifies a contaminant, from its environment? (yes) Do you think this same thing could happen with crops grown in contaminated soil or watered with contaminated water?*

- **Optional Activity: “Read Aloud”: The Desert is Theirs by Byrd Baylor (10 minutes):** A book about animals that live in natural balance with the desert.



1. Brief synopsis: “You may think of the desert as a harsh, dry place where no one would ever want to live -- but think again. The Desert People know. So do the animals. Both love the land, and "share the feeling of being brothers in the desert, of being desert creatures together.”
2. Read the book aloud to the class and discuss the students’ reactions to the story.

Evaluation Questions (5 minutes)

1. *Where do organisms on a food pyramid get their energy?* (Answer: from the group of organisms below them on the food pyramid. The sun is always the source of all energy)
2. *What is a food pyramid?* (Answer: a food chain that shows the amounts of organisms at each level of the chain)
3. *What is the difference between organic and conventional farming?* (Answer: organic farming does not use synthetic chemical pesticides)
4. *Which level of the food pyramid is most affected by pesticides- the top or the bottom?* (Answer: animals eat plants, animals eat other animals that may eat the plants, insects make the soil better for plants, etc.)
5. *How can a change in one part of the food chain affect another part?*
6. *How much water should you drink every day?* (Answer: at least 6 cups of water a day)
7. *How many fruits and vegetables should you eat every day?* (Answer: at least 5 fruits and vegetables a day)
8. *Does gardening connect you to your culture and help you learn new words in your language?* (Answer: yes)

Preparation for Future Lessons – Reminder for the Instructor

- Review the materials and preparation needed for the next lesson.
- Remember that an Elder guest instructor is needed for these Spring lessons: lesson 1 (Eating a Rainbow), lesson 4 (Conserving Water: A Renewable Resource), and lesson 9 (Plant Parts: Flowers and Pollination).

Notes
