



# Photosynthesis and You

## Purpose

In this lesson, students will learn about the process by which plants make their own food. Students will understand how photosynthesis provides the food they eat.

### Extension

*Fun With the Plant Nutrient Team* student activity book on pages 6, 9, 10.

### Time

One 45-minute session for activity sheet  
Two weeks for experiment

### California Standards

This lesson addresses K-3 Common Core State Standards for English Language Arts and Next Generation Science Standards. Standards alignment is listed in the matrix on page 37.

### Materials

*For the teacher:*

- *Fun With the Plant Nutrient Team*

student activity book

*For the class experiment:*

- Three identical plants: One planted in potting soil, two planted in sand
- One heavy, brown paper bag

*For each student:*

- *Fun With the Plant Nutrient Team* student activity book
- *Photosynthesis and You* handouts pages 16-17
- Crayons, colored pencils, or markers

## Background Information

Photosynthesis is the process by which plants and some algae and bacteria capture sunlight energy to make their own food.

The inputs for photosynthesis are sunlight, carbon dioxide, and water. The outputs are oxygen and carbohydrates in the form of sugars or starch.

People would not have food to eat if it weren't for photosynthesis. Plants need the process to make their food, and people and other organisms depend on consuming plants or other organisms that eat plants. Plants and animals are interdependent; plants need the carbon dioxide that animals release during respiration and animals need the oxygen released by plants during the process of photosynthesis.

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Plant leaves are the main site of photosynthesis. The chemical chlorophyll allows special cell structures called chloroplasts to absorb light energy. Carbon dioxide passes through the stomata on the underside of the leaves and moves to the cells where energy from the sun has been trapped and stored. Water is absorbed by the root hairs and transported up the stem. Through a chemical reaction, water and carbon dioxide are converted into carbohydrates that are used by the plant for energy and growth. Oxygen is released from the plant into the atmosphere.

### **Plant Experiment Procedure**

Have students turn to page six in their *Fun With The Plant Nutrient Team* student activity book. Explain that they will be carrying out this experiment as a class.

Explain that plants A, B, and C are all the same types of plants and are the same age. *Note: tomato seedlings work well for this experiment.* The class will note their observations of the three plants on days 1, 4, 7, 11, and 14 on page six.

1. Show students that Plant A is planted in sand and will be watered with distilled water. Explain that distilled water has been filtered so it does not contain any minerals or nutrients. Plant A will be set in a place where it receives sunlight for most of the day.
2. Show students that Plant B is planted in potting soil that contains the important nutrients for plant growth. Plant B will be watered with tap water and will be set in a place where it receives sunlight for most of the day. Explain that tap water has been treated so it is safe for people to drink and may also contain some minerals.
3. Show students that Plant C is planted in sand and will be watered with tap water. Place Plant C inside a heavy brown paper bag so it does not receive sunlight.
4. Ask students to predict which plant will be the healthiest at the end of the experiment and why. Tally votes on the board and make a bar graph of class predictions.
5. Give all three plants the same amount of water on the same days as needed.
6. Allow students 5-10 minutes to observe the plants and write down their observations on days 1, 4, 7, 11, and 14. Older students can write down notes with descriptive observations while younger students can use the smiley faces on page six.
7. On day 14 of the experiment, compare the results with the class predictions. What plant is the healthiest and why? What plant did not do well and why? Discuss these questions and answers as a class.

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8. Explain that Plant C did not get sunlight and therefore, was not able to carry out photosynthesis to make its own food. When a plant cannot make its own food, it doesn't have energy to carry out life processes and it will become sick or die. Plant C was also planted in sand, which does not contain the nutrients that are important for plants to survive.
  9. Explain that Plant A was planted in sand, which does not contain the nutrients that are important for plants to survive. It was also watered with distilled water, which doesn't have any nutrients. For these reasons, plant A didn't grow much and wasn't very healthy at the end of the experiment.
  10. Explain that Plant B is likely the healthiest because during the experiment it received everything a plant needs to grow and be healthy. Plant B received sunlight, water, and potting soil that contained important nutrients for plant growth.
  11. Ask students why it is important to have healthy plants that can carry out the process of photosynthesis. Explain that we depend on photosynthesis for plants to make the food that we eat. Use a bowl of cereal and milk as an example. Where did the wheat, rice, or corn in the cereal come from? (plants) Where did the milk come from? (a cow) What do cows eat? (plants/grass)
  12. Show students an animated video of the photosynthesis process:  
[www.sites.ext.vt.edu/virtualforest](http://www.sites.ext.vt.edu/virtualforest)

### **Worksheet Procedure**

1. Provide the student handout, *Photosynthesis and You*, to older students and read aloud as a class. For younger students, summarize the main points of the reading to provide background information for the drawing activity.
2. Lead students through the photosynthesis drawing activity step by step.

# Photosynthesis and You

Did you know that plants are able to make their own food? The word “photo” means light, and the word “synthesis” means putting together. The word photosynthesis means putting together with light, which is exactly what happens as plants make their own food with the energy of the sun.

Plants take in the water and nutrients they need for photosynthesis from the soil through their roots. The water and nutrients are moved through tiny root hairs into the roots, and then travel up the stem, in special tubes, to the leaves where photosynthesis takes place.

During photosynthesis, the trapped energy from the sun, carbon dioxide from the air, and water come together to make the plant’s “food” and oxygen. The food provides energy the plant needs to grow, or it is stored in parts of the plant as sugar or starch for later use. The oxygen is released through the tiny holes in the leaf out into the atmosphere.

When you eat plant parts such as potatoes, apples, celery, and raisins, you are using the plant’s stored energy to do all the things your body needs to do.

Now you know that you and the Earth’s plants have a very important relationship. You need each other! Plants cannot survive without the carbon dioxide that you breathe out and you cannot live without the oxygen and food that comes from plants.

# "Photosynthesis and You" Drawing

Name \_\_\_\_\_

## Directions

1. Draw a tomato or corn plant on a piece of paper making sure you include roots, stems, and leaves.
2. Add the sun and put arrows showing how it shines on your plant leaves.
3. Now add soil.
4. Add water droplets to the soil.
5. Write carbon dioxide in the air and put an arrow from the carbon dioxide into the leaf.
6. On the other side of your leaf, write the word "oxygen" and put an arrow showing that oxygen is coming out of the leaf.
7. Your plant is carrying out the process of photosynthesis. It is also growing food for you to eat. Draw a tomato on your tomato plant or an ear of corn on your corn plant.
8. Draw a picture of you eating the tomato or corn.
9. Under your picture, explain why photosynthesis is important to you.