

"Plants Need Light Too," p.139-140. ***The Growing Classroom: Garden-Based Science.** Jaffe, Roberta and Appel, Gary. Addison Publishing Company, 1990.

California State Standards:

Science 5th Grade: 2a, e-g; 6d, h Science 6th Grade: 5a; 7e

Plants Need Light Too

Chlorophyll uses energy from light to combine carbon dioxide from the air and water from the soil to make sugar. This sugar is used by the plant to make other organic compounds such as starch, proteins, fats, and cellulose. When these compounds are oxidized in plants, animals, or by burning, the energy used in making the sugar is released as heat or to cause motion. The carbon dioxide and water used to make the sugar are also released,

Description

Cork disks prevent light and air from reaching a section of leaf. The leaf is then treated and tested for starch content.

Objective

To demonstrate that plants need light to produce food.

Teacher Background

Plants need air and light. Green plants make food from water in the soil, carbon dioxide in the air, and sunlight. The carbon dioxide enters the plant through small openings in the leaves. The chlorophyll in leaves gives leaves their green color. A plant needs sunlight to keep the chlorophyll active and the leaves green. The chlorophyll reacts with the carbon dioxide and water to produce starch, the plant's food.

A simple test for the presence of starch is to place a drop of iodine on the substance to be tested. If it turns blue-black, starch is present. In this demonstration, you may want each of the four groups to set up a demonstration plant and then analyze the results together. You should be responsible for heating the alcohol. Follow the directions: *Do NOT place the alcohol directly on the flame.* Within six hours after putting iodine on the colorless leaf, the leaf should turn black except over the area that the cork was covering. The cork prevents the carbon dioxide in the air from entering the leaf. The cork also keeps sunlight from reaching the covered part of the leaf, preventing photosynthesis and food production.

Materials

Cork cut into thin disks
Alcohol burner
Pins
Rubbing alcohol
Two beakers, one larger than the other
Burner stand
One plant with large leaves per group
Iodine
Eyedropper



Preparation

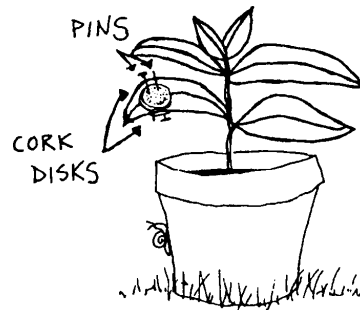
(Optional) Demonstrate to the class that iodine tests for the presence of starch. Mix a few drops of iodine in water and add a few drops to water that is mixed with cornstarch. Observe the different colors. How does iodine show that starch is present? Test food samples, such as bread, milk, potato.



What do plants need in order to grow? (water, air, sunlight, nutrients) What does the plant do with these ingredients? (makes its own food) How do the air and sunlight get into the plant? (through the leaves) What do you think would happen if the leaves were blocked from getting air and sunlight? (Record predictions.)



1. Have the class work in groups of four.
2. Have groups test one leaf on each plant for starch, and record results.
3. Provide two cork disks for each plant.
4. Have students use pins to sandwich a leaf on the plant with the cork disks.
5. Place the plant in the sun for six-to-eight days.
6. Have students remove the cork disks and pick the leaves.
7. Light the alcohol burner.
8. Place each leaf in a beaker of alcohol.
9. Put the beaker of alcohol inside a larger beaker of water and place it on the burner. **THE ALCOHOL BEAKER SHOULD BE HEATED IN THE WATER. ALCOHOL SHOULD NEVER BE PLACED DIRECTLY ON A FLAME.**
10. After 15 minutes, the leaf color will be gone.
11. Remove each leaf from the alcohol and have students rinse them in water.
12. Have students gently blot each leaf with a paper towel.
13. Test each leaf for starch (food) by putting iodine drop by drop over the entire leaf. Iodine turns blue-black if starch is present.
14. Discuss the results.



What were the results of this experiment? What can you conclude from the results? (Plant does not make food without air and sunlight.) How could you tell if food was present? Did this experiment have a control? (Yes. The part of the leaf that wasn't covered.)



Ask, Why do mushrooms grow in the dark? (They're fungi, not plants.) Where do they get their energy and nutrients?
