

# What Do Plants Need?

## (Sessions I and II)\*

### BROWARD COUNTY ELEMENTARY SCIENCE BENCHMARK PLAN

#### Grade 1—Quarter 2

#### Activities 19 & 20

##### SC.A.1.1.1

*The student knows that objects can be described, classified, and compared by their composition (e.g., wood or metal) and their physical properties (e.g., color, size, and shape).*

##### SC.B.1.1.1

*The student knows that the Sun supplies heat and light energy to Earth.*

##### SC.F.1.1.1

*The student knows the basic needs of all living things.*

##### SC.F.1.1.4

*The student understands that structures of living things are adapted to their function in specific environments.*

##### SC.H.1.1.1

*The student knows that in order to learn, it is important to observe the same things often and compare them.*

##### SC.H.1.1.3

*The student knows that in doing science, it is often helpful to work with a team and to share findings with others.*

##### SC.H.1.1.4

*The student knows that people use scientific processes including hypothesis, making inferences, and recording and communicating data when exploring the natural world.*

##### SC.H.1.1.5

*The student uses the senses, tools, and instruments to obtain information from his or her surroundings.*

### ACTIVITY ASSESSMENT OPPORTUNITIES

The following suggestions are intended to help identify major concepts covered in the activity that may need extra reinforcement. The goal is to provide opportunities to assess student progress without creating the need for a separate, formal assessment session (or activity) for each of the 40 hands-on activities at this grade level.

\*indicates Scientific Method Experiment

- 1. Session I—Activity 19:** Remind students that an experiment is a way of testing a science question by keeping some things the same and letting something else change. Ask, *When you planned your experiment, why did you keep some things the same for both plants?* (We wanted to test whether plants need light in order to grow and stay healthy. If we changed the amount of water each plant got or the temperature or the soil, we wouldn't be able to tell which things were making the plants healthy or not healthy.)
- 2. Session II—Activity 20:** Ask, *At the end of your experiment, how could you tell that each plant was healthy or not healthy?* (Accept all differences that students observed. For example: The healthy plant had dark green leaves; it was bushy; and it was standing up straight. The plant that was not healthy had yellow [or brown] leaves; it was not bushy; and it was not standing up straight.) *Did your conclusion answer the science question you asked at the beginning of the experiment?* (Yes. We asked whether plants need light to stay healthy, and the experiment showed that plants do need light.)
3. Use the Activity Sheet(s) to assess student understanding of the major concepts in the activity.

In addition to the above assessment suggestions, the questions in bold and tasks that students perform throughout the activity provide opportunities to identify areas that may require additional review before proceeding further with the activity.

# What Do Plants Need?

## OBJECTIVES

Students grow plants with and without light to learn what growing conditions plants need to stay healthy. They follow accepted scientific methodology in carrying out and reporting on the experiment.

### The students

- ▶ set up an experiment to determine whether plants need light
- ▶ monitor the health of plants grown in light and in darkness
- ▶ determine that plants need light to stay healthy

## SCHEDULE

**Session I—Activity 19** About 30 minutes, followed by observations after 2 weeks

**Session II—Activity 20** About 20 minutes, 2 weeks after Session I

## VOCABULARY

conclusion  
experiment

## MATERIALS

### For each student

- 1 Activity Sheet 19, Parts A and B

### For each team of four

- 2 boxes crayons  
2 plants, bean  
1 tray, plastic

### For the class

- 1 pair scissors\*  
2 sprinkler bottles\* or spray bottles\*  
1 roll tape, masking  
4 trays, plastic  
water, tap\*  
Delta Science Reader,  
*Properties*

\*provided by the teacher

## PREPARATION

- 1 Make copies of Activity Sheet 19, Parts A and B, for each student.
- 2 Each team of four will need two of the bean plants you have been growing. (See Advance Preparations, page 141.) Choose only healthy plants, and give each team two plants that are very similar in size, number of leaves, and so forth. Leave the plants in their pots.
- 3 Locate a dark place, such as a closet, where students can keep half their plants for two weeks. If a closet is not available, a large cardboard box that covers the plants will work. Keep in mind that students will need access to the plants so they can water them.
- 4 Attach masking-tape labels to four plastic trays. Label two trays *Light* and two trays *Dark*.

**Safety Note:** Check for any student allergies to plants or pollen before having students handle plants or plant parts.

## BACKGROUND INFORMATION

There are hundreds of thousands of plant species on Earth, thriving in a variety of growing conditions. Regardless of where they grow, all plants need light, water, nutrients, and air (oxygen and carbon dioxide, among other gases). Without these basic elements, plants cannot survive.

In this activity, students observe the effect of darkness on the health of plants. They discover that when plants are deprived of light, they become pale and spindly. Plants contain a chemical in their leaves and stems called chlorophyll. Chlorophyll is a pigment that gives plants their green color. The chlorophyll absorbs light energy and uses it to convert carbon dioxide and water into sugars—food for the plant. This process is called photosynthesis. Without light, no chlorophyll is produced, and the plant literally “starves.”

Over millions of years, plant species have adapted to the conditions in their environments. For example, plants growing in dim light may have large leaves with a large surface area for absorbing light. Vines that grow in the jungle climb tree trunks to reach sunlight.

Any change in growing conditions can slow or stunt the growth of a plant. It can also weaken the plant, making it susceptible to disease. However, those plants that are not weakened continue to thrive and reproduce new generations of hardy plants.

### ▼ Activity Sheet 19, Part A

#### What Do Plants Need?

- Title**  
Growing Plants in Light and Dark
- Question**  
Do plants need light to stay healthy?
- What do you think the answer to your question will be?**  
Sample answer: Plants need light to stay healthy.
- How can you make the two plants different?**  
I can grow one plant in the dark and the other plant in light.
- How can you keep the two plants the same?**  
I can give them the same amount of water and the same kind of soil. I can keep them at the same temperature.

### ▼ Activity Sheet 19, Part B

#### What Do Plants Need?

- Observations**  
Draw pictures of your two plants. Use your crayons to match the colors of the real plants. Label the plants *Light* and *Dark*.

Students' drawings will vary. They will probably use a yellow crayon to show that the plant grown in the dark is yellowed and a green crayon to show that the plant grown in light is green and healthy.

- Conclusion**  
What is one growing condition that plants need to stay healthy?  
Plants need light.

## Guiding the Activity

### Additional Information

### Session I—Activity 19

- 1 Ask students to imagine what life would be like if there were no sunlight. Have them suggest some of the things that might happen if it was always dark. Guide the discussion toward the effect of light on living things. Ask, **Do you think plants need light?**

Ask, **How do you think we can find out if plants need light?**

*Accept all answers.*

*Accept all ideas. Students might guess that they can try to grow a plant in the dark. Do not confirm or deny their guesses at this time.*

- 2 Give each student a copy of **Activity Sheet 19, Part A**. Tell students that one way they can find out if plants need light is to do an experiment. Explain that an **experiment** is a way of testing a science question by keeping some things the same and letting other things change. Have students suggest a title for their experiment and write it in step 1 on the activity sheet. Then in step 2, have them write in their own words the science question they will test.

*As needed, help students formulate a title and state a question, giving them assistance with spelling and phrasing. You may choose to do this as a class exercise and write the entries on the board or on an overhead transparency made from the activity sheet for students to copy.*

- 3 Have students think of a possible answer to the stated question and write it in step 3.

Explain that in this experiment, they will be using two plants. Everything that is done to one plant must also be done to the other plant—except for one thing. By doing this, they can be sure that the one thing that is different in the two plants is what is causing the results they see.

Ask, **What thing could you make different for the two plants that might answer the science question you are testing?**

Ask, **What things should you keep the same for both plants?**

Have students record their answers in steps 4 and 5 on the activity sheet.

*Students may suggest that plants need light to stay healthy.*

*Students may suggest that one plant could be grown in the dark and the other in light.*

*Students may suggest that the two plants should be the same kind, given the same amount of water, grown in the same kind of soil, and kept at the same temperature.*

## Guiding the Activity

- 4 Divide the class into teams of four. Give each team a plastic tray, two plants, and two pieces of masking tape. Have them label each pot with a team member's name and either *Light* or *Dark*.

Tell students to water both plants with the same amount of water. Have them put the plant labeled *Light* on a tray on a sunny windowsill and the plant labeled *Dark* on a tray in a closet or under a cardboard box.

- 5 Designate a different student volunteer to lightly water all of the plants each day for two weeks. The Dark plants should be exposed to light for as short a time as possible.

### Session II—Activity 20

- 6 After 2 weeks, have students review the condition of the plants. Place the plants on a table where all students can see them. Have students compare the appearance of the plants in the two groups (see Figure 19-1).

Ask, **Which plants look healthier? How did the other plants look?**

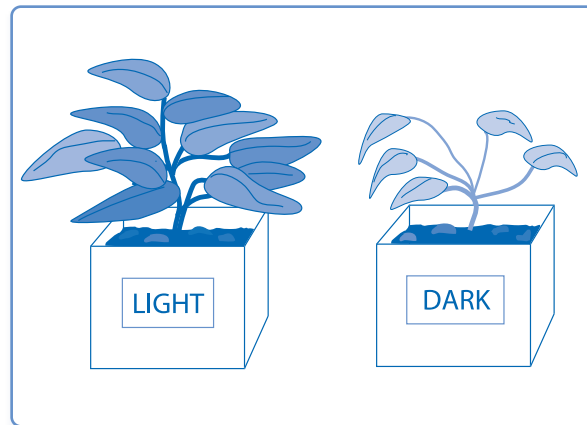
Distribute a copy of **Activity Sheet 19, Part B** to each student. Have each team retrieve their two plants and examine them. Ask, **How do your two plants compare?**

Have students draw and color the two plants in step 6 on the activity sheet.

## Additional Information

**Safety Note:** Have students wash their hands after they have put the plants on the trays.

If a spray bottle is used, giving each plant the same number of squirts of water is an easy way for students to water the plants equally.



▲ **Figure 19-1.** Comparing the health of plants grown in light and in darkness.

Students should note that the plants grown in light look healthier and those grown in the dark look pale and not healthy.

Accept all reasonable responses. The plants grown in the dark will be pale and spindly, while the plants grown in light will be dark green and healthy.

## Guiding the Activity

- 7 Tell students that an experiment usually has a conclusion. A **conclusion** is the answer to the question that the experiment tested. Write the term *conclusion* on the board and read it aloud to students. Ask, **What is your conclusion in this experiment?**

Have students write the conclusion in step 7.

- 8 Tell students that the things that affect plant growth are called *growing conditions*—the conditions in which the plant grows.

Ask, **What are some growing conditions of plants?**

Ask, **What growing condition did you test in this experiment?**

Ask, **How can you tell if a plant is receiving the right amount of light?**

- 9 Remind students that plants make their own food. Explain that the plant parts where this happens are the leaves. A green chemical in the leaves uses energy from the Sun to make food from water and a gas (carbon dioxide) in the air. The food is a very simple kind of sugar.

Explain that when plant leaves do not get light, the green chemical disappears, and the leaves turn yellow. That is what happened with the plants they grew in the dark.

## Additional Information

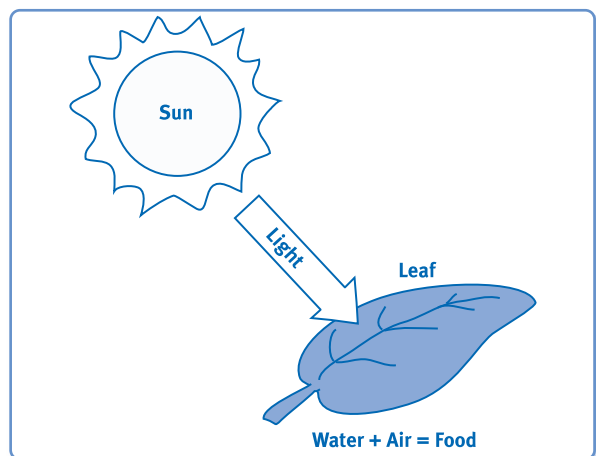
*Students should say their conclusion is that plants need light to stay healthy.*

*Students may suggest the amount of light and water a plant receives, the type of soil it is planted in, the temperature of the air, and other factors.*

*the amount of light*

*It will look healthy.*

*To clarify this process, draw a simple diagram on the board (see Figure 19-2).*



▲ **Figure 19-2.** Plants use light to make food from water and carbon dioxide.

## Guiding the Activity

- 10 As appropriate, read or review pages 2–13 of the Delta Science Reader *Properties*.

## Additional Information

## REINFORCEMENT

Have students repeat the activity, using light and water conditions of their own choosing. For example, they might want to find out whether plants in partial sunlight need less water than plants in full sunlight.

## SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

## CLEANUP

Have students place the Dark plants in light so they will recover. You may want to save the plants for further experimentation. If not, discard the plants, put the soil back in the bags, and rinse and dry the planter pots. Return the pots, soil, crayons, and trays to the kit.

## Connections

### Science Challenge

Let students investigate what happens to plant leaves when they do not receive enough light. Have each team use a plant with medium-size to large leaves. Tell students to cut a piece of aluminum foil slightly larger than one of the plant's largest leaves, cover the top of the leaf with the foil, and hold the foil in place with paper clips. Have teams leave their plants in a sunny spot for a few days, then remove the foil and examine the leaf. (It will be yellowish instead of a rich green color.) Explain that a yellowed leaf cannot make food for the plant. If all the leaves turned yellow, the plant would die or would "rest" until the next growing season.

### Science Extension

Encourage students to volunteer to care for houseplants at home. Do all the plants in their homes need the same amounts of water or sunlight? What other things should they do to take care of houseplants? (remove dead leaves or flowers, repot when a plant gets large, add plant food) Students could also take two plants of the same kind, grow them in different conditions, and compare the results.

### Science and Language Arts

Use the words *leaf* and *leaves* to reinforce students' understanding of irregular plural nouns. Have each team divide a sheet of paper into two columns with the headings *One* and *More Than One*. Tell them to write *leaf* in the first column and *leaves* in the second column. Then tell students to add as many words as they can think of that have irregular plurals (*man/men, foot/feet, knife/knives, mouse/mice, tooth/teeth, goose/geese*, and so forth). Post all the teams' lists in the classroom. Let students add more words as they think of them or encounter them in their reading, spelling, and subject-area activities.

