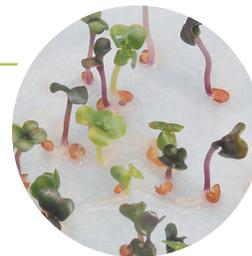


# What Do Plants Need to Grow?

## A Carolina Essentials™ Investigation



### Overview

Students can examine the phenomenon of plant growth with this guided inquiry activity. Students manipulate the amount of sunlight and water to which Wisconsin Fast Plants® seed disks are exposed. They count the number of seeds that sprout daily for 4 days, and then use the data to draw conclusions and explain what resources plants need to grow.

### Life Science

Grade: 2

### Essential Question

What do plants need to grow?

### Investigation Objectives

1. Can plants grow in the dark?
2. Can plants grow without water?

### Next Generation Science Standards\* (NGSS)

**PE 2-LS2-1.** Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"><li>• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.</li></ul>	<b>LS2.A: Interdependent Relationships in Ecosystems</b> <ul style="list-style-type: none"><li>• Plants depend on water and light to grow.</li></ul>	<b>Cause and Effect</b> <ul style="list-style-type: none"><li>• Events have causes that generate observable patterns.</li></ul>

### Safety Procedures and Precautions

Remind students to wipe up water if it spills and to treat the sprouts gently. Ensure that no students have plant allergies before beginning the investigation.

### Teacher Preparation and Disposal

Precut the squares of aluminum foil. Seed disks may be disposed of in the trash when the investigation is complete.

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### TIME REQUIREMENTS



**PREP** | **ACTIVITY**  
30 min | 2.25 hrs

**Teacher Prep:** 30 min

**Student Activity:** 2.25 hrs

### MATERIALS (PER GROUP)

4 Wisconsin Fast Plants® seed disks

4 plastic containers with lids (8 oz)

1 25-mL graduated cylinder

Water

2 aluminum foil squares, 10 × 10 in

1 marker

### HELPFUL LINKS

[Exploring with Wisconsin Fast Plants® Manual](#)

[Wisconsin Fast Plants® Poster](#)

### REFERENCE KITS

[Wisconsin Fast Plants® Tropism: Plant Growth in Response to a Stimulus Kit](#)

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### Student Procedure

#### Day 1

1. Label the lids of the containers with your group number and these details:
  - A. Sun and Water**
  - B. Dark and Water**
  - C. Sun and Dry**
  - D. Dark and Dry**
2. With a pencil, label the seed discs **A, B, C,** and **D.**
3. Count the number of seeds on each disc. Write the number of seeds in the data table under Day 1.
4. Put Disk A in **Container A—Sun and Water.**
5. Measure **10 to 25 mL** of water in the graduated cylinder.
6. Slowly pour the water into the container. The seed disk should be damp but not underwater.
7. Show the teacher the container. Put the lid on.
8. Put **Disk B** in **Container B—Dark and Water.**
9. Measure **10 to 25 mL** of water in the graduated cylinder.
10. Slowly pour water into the container. The seed disk should be damp but not underwater.
11. Show the teacher the container. Put the lid on.
12. Wrap up **Container B** with a piece of aluminum foil. Make sure no light can get to the seeds.
13. Put **Disk C** in **Container C—Sun and Dry.** Put the lid on.
14. Put **Disk D** in **Container D—Dark and Dry.** Put the lid on.
15. Wrap up **Container D** with a piece of aluminum foil. Make sure no light can get to the seeds.
16. Your teacher will tell you where to put the containers.

#### Day 2

1. Count the number of sprouts in **Container A—Sun and Water.** Write the number in the data table.
2. Unwrap **Container B—Dark and Water** and count the number of sprouts. Write the number in the data table. Wrap up the container.
3. Count the number of sprouts in **Container C—Sun and Dry.** Write the number in the data table.
4. Unwrap **Container D—Dark and Dry** and count the number of sprouts. Write the number in the data table. Wrap up the container.
5. Your teacher will tell you where to put the containers.

#### Days 3 and 4

1. Repeat the steps for **Day 2.**

#### Day 5

1. Repeat the steps for **Day 2.**
2. Throw the plants away.

Continued on the next page

### Teacher Preparation and Tips

*This investigation may be completed as a small-group or whole-class project. If conducting as a group project, assign each student in the group a task—seed counter, container labeler, water measurer, data recorder.*

*Make sure disks A and B (the water discs) stay moist during the 5-day period. The disks should be moist but not underwater. The fabric is designed to wick water.*

*Sun containers are best placed in a window. If you do not have windows, place them under a light bank or lamp.*

*Germination will begin in 48 to 72 hours.*

*Define sprout as a small plant with visible roots and small seed leaves. You may want to introduce the terms root hairs and cotyledons.*

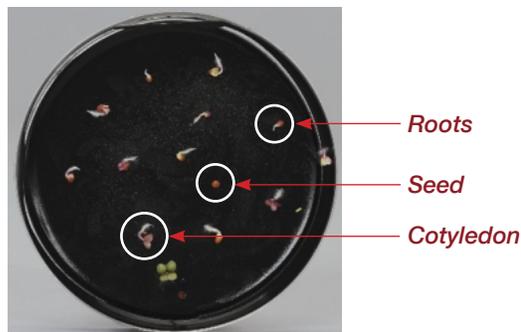
*Students may want to examine the sprouts with a magnifying glass or hand lens to see the tiny roots and leaves.*

*Make certain that the container is completely covered in foil so no light can enter.*

*It is a good idea to keep a running class data table even if students are working in small groups. The data table allows for addition and division if grand totals and averages are calculated.*

*Check containers daily for the correct amount of water and complete coverage of aluminum foil.*

*If appropriate, introduce the terms seedling and germination to students.*



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### Data and Observations

Seeds and Sprouts

Container	A	B	C	D	Total
Day 1 Seeds					
Day 2 Sprouts					
Day 3 Sprouts					
Day 4 Sprouts					
Day 5 Sprouts					

*Each seed disk should have 16 to 18 seeds.*

*Student answers will vary, but Container A—Sun and Water should have the most sprouts.*

*There may be enough room moisture to have a couple of seeds sprout in Container B—Dark and Water, but they should not fully develop.*

*Container C—Sun and Dry may also have some early sprouts, but they will not fully develop without water.*

*Container D—Dark and Dry should not have any sprouts at all.*

*For student sketches, look for small roots, root hairs, stems, and small round leaves (cotyledons). Colored sketches are best. Stems may be purple on some sprouts.*

### Analysis and Discussion

1. Did all the containers have seeds that sprouted? **Dark and Dry should not have sprouts. Sun and Dry should not have sprouts. If there is high humidity in the classroom and the seed disks have absorbed moisture from the air, there is a possibility that a seed may sprout. Dark and Water may have roots but should not develop cotyledons.**
2. Which container had the most sprouts? **Sun and Water should have the most sprouts.**
3. Which container had the least sprouts? **Dark and Dry, Dark and Water, and Sun and Dry should have the least sprouts. Dark and Dry will likely have no sprouts.**
4. Look at your drawings. Which container had the healthiest sprouts? **Sun and Water should have the healthiest looking sprouts.**

### Conclusions

1. Do plants need sun to sprout? How do the data show that? *Plants need sunlight to grow. The data support this because the cup covered in foil did not have any sprouts.*
2. Do plants need water to sprout? How do the data show that? *Plants need water to grow. The data support this because the cup that had no water added did not have any sprouts.*
3. What do plants need to grow? Include evidence that supports your statement. *Plants need both water and sunlight to grow. The cup with both sun and water had the most sprouts. The cups without water or sun did not have any sprouts.*

# What Do Plants Need to Grow?

*A Carolina Essentials™ Investigation*

## TEACHER NOTES