

Room to Grow

The following activity is inspired by the lesson “Make Room for Raddy” from the curriculum guide [GrowLab: Classroom Activities for Indoor Gardens and Grow Lights](#). This curriculum brings plant-based explorations to life through 46 lesson plans and hundreds of extension activity ideas that spark students' curiosity about plants and invite them to think and act like scientists. Click here for more information or to order this guide.



Overview: Students will explore how plants may not reach their full potential when grown in crowded space and forced to share limited resources.

Grade Level/Range: K – 5th Grade

Objective: Students will observe how plants grow when provided different amounts of space. They will learn that when competing for resources, plants may not be able to reach their maximum potential.

Time: 4 weeks

Materials:

- Drawing Paper
- 8 ½ x 11 in. White Paper (copy paper or computer paper)
- Crayons
- Tape
- Radish seeds
- Container, raised bed or in-ground garden space

Background Information

All plants need water, air, light, nutrients and a place to grow. Here is a brief description of how each of these needs contributes to plant growth and development:

Water - Plants need water for a number of important processes, including photosynthesis (production of food) and transpiration (evaporation of water from the leaves into air that cools the plant and creates pressure to move water from roots to leaves). Water also aids in the absorption of some nutrients.

Air - Plants take in carbon dioxide and oxygen to use during photosynthesis.

Light - Energy from light is captured to use during photosynthesis. Photosynthesis is the process by which plants make their food.

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Nutrients - Just as people need vitamins, plants also need certain nutrients to help them grow properly and for their biological processes to function. Plants obtain most of their needed nutrients from the soil. Nutrients occur naturally in the soil as a byproduct of decomposition of organic matter and the weathering of rocks. They can also be added through fertilizer applications. *A special note: fertilizer is sometimes referred to as “plant food;” however, plants make their own food (carbohydrates) through the process of photosynthesis. Fertilizer is more accurately compared to a multi-vitamin.

Place to Grow - Plants need a place to call their own, where the roots can anchor, the stems can grow, and the leaves can capture light.

Although the needs of all plants are the same, how much they need of each of these components varies. Some plants need a lot of light to grow; others are adapted to thrive in more shady conditions. Some plants use a lot of water on a regular basis, while others have features that conserve water and have lower water needs.

Ultimately, each plant grows best when they have the space that provides the basic needs in their optimum amounts. Gardeners can use this information to design gardens that maximize the harvest within the space they have available.

Laying the Groundwork

Divide your class into even numbers of small groups of 4 to 6 students. Ask each group to draw a mural of plants growing in a garden. Give half the groups the following supplies and space:

- a long sheet of drawing paper
- enough crayons for each student
- an unlimited area to draw

Give the other half of the groups:

- a sheet of computer paper
- half the number of crayons as the size of the group
- restrict their group area to a 4-by-4 foot square taped on the floor

Give each group 5 minutes to draw. Display the resulting murals and then ask:

- How did you feel about your drawing experience? Did you have any problems? What were they? What do you think was different about the two groups’ experiences?

Help the group focus on the contrast between having limited resources and having plenty of resources. Ask,

- Besides lack of space, what else was in short supply? What might happen if you never got enough of what you needed? How do you think a lack of space might affect plants?

Exploration

To explore how space can impact plant growth, set up an experiment to examine how radishes respond to crowding. This can be done in containers or in a raised bed or in-ground garden where you establish plots of equal size.

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1. Obtain at least 5 pots of equal size or measure at least 5 identical 1-by-1 foot plots in raised or in-ground beds.
2. The recommended spacing for radish seeds is to sow them approximately 1 inch apart and then, when they're an inch or two tall, thin the seedlings to approximately 2 inches apart. Use this information to plant your pots or plots with different numbers of radish seeds. For easy comparison, you could plant in multiples of 5 (5, 10, 15, 20, 25, etc.) or choose other amounts based on the space you have available. Record how many seeds were planted and, ultimately, how many plants you grow in the pots or plots.
3. Ask students to write down their predictions for how the spacing will impact the growth of their radish plants.
4. After 4 weeks, harvest your radishes, making sure to keep track of which plot or pot they came from. Measure your plants — both the foliage and the root (radish) — and weigh them. Also ask students to evaluate the health of each plant based on appearance. Discuss the following:
 - Did the measurements of the radishes vary based on the amount of space they had to grow?
 - Did this data match your predictions?
 - Which plants looked the healthiest?
 - Can you make any conclusions about plant needs based on this experiment?

Making Connections

Knowing the space requirements of plants is important when planting a garden. Learn more about [Square Foot Gardening](#) and how gardeners can use this information to plot out a garden design especially in locations with limited space available. Use seed catalogs (printed or online), to discover space requirements of different plants and use this information to design your own dream garden.

Branching Out

Take a walk around your schoolyard or a nearby natural space and see if you can find examples of overcrowding. What do you think will eventually happen? Look for a large tree. How many plants do you find underneath?

Repeat the experiment above with different types of seeds and observe how different plants respond to varying space in terms of height and width. You may notice that some crowded plants will actually get taller as they compete for light.

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