

Celebrating Diversity in the Garden

Lesson plan created in collaboration with Sonya Harris, an educator who spearheaded the award-winning Bullock Children's Garden at the Dorothy L. Bullock Elementary School in Glassboro, NJ. The garden serves to assist in teaching across the curriculum through garden education while providing fresh, organic produce to the local low-income community & helping reduce the impact of the food desert in which the school is located.



Overview

Just like nature, garden ecosystems thrive when they include a diversity of plant and animal life. From the smallest microorganism decomposers in the soil working to release nutrients to the towering trees providing shade, the relationships formed among all the living things in the ecosystem create a beautiful and intricate web of life. In this lesson, students will explore the benefits of biodiversity and how it makes the garden ecosystem stronger by learning about a technique known as companion planting. They can extend the lesson by discussing how diversity is also beneficial in other settings like in their classroom and community.

Grade Level/Range: 9-12

Objective: In this lesson, students will:

- Learn about the importance of biodiversity in ecosystems.
- Explore symbiotic (mutually beneficial) relationships in the garden by researching companion plants.
- Design a garden that demonstrates biodiversity.

Time: 1 hour

Materials:

Natural area to explore or pictures of a natural area

Internet access or resource books

Materials to create a garden plan, such as:

Option 1: Collaborative/Individual Poster
poster board
scissors
glue sticks
pencils

Option 2: Collaborative/Individual Drawing
graph paper
markers or colored pencils
pencils

Option 3: Digital Garden Planning
technological device (computer/tablet/smartphone)
paper for printing

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Note: Provide proper visual, physical, and language modifications and/or accommodations for equitable access to the activities.

Background Information:

In nature, diversity is key to ensuring a healthy ecosystem. Plant and animal life both above and underground form relationships that help keep their populations in balance with the natural resources available to them. For example, some plants are adapted to shade and grow low on the ground, which helps protect the soil from erosion. Other plants, like some trees, need full sun and will reach high into the sky. Underground, decomposers release stored nutrients that plants will absorb through their roots. In return, the plant roots will give off sugars (called exudates) that have been created through photosynthesis that feed those same microorganisms. Everywhere you look, you can see circles of life as all the living things in an ecosystem depend on one another.

As human civilizations developed and populations grew over many millennia, we left behind the wisdom of nature and began to create gardens and farms that represented monocultures — systems that involved growing single crops in mass. Although the goal was to create more efficient food systems, monocultures resulted in unintentional negative impacts on the environment. Scientists and farmers are now rediscovering the importance and benefits of planting a diversity of species or, in other words, encouraging biodiversity. Over time, diverse systems result in much more efficient use of resources and are a key factor for ensuring sustainability.

In the garden, one of the ways we explore the benefits of diversity is through companion planting. [Companion planting](#) is the purposeful planting of different combinations of plants that act as partners and grow better together than on their own. Benefits to companion planting include sharing of nutrients and space, helping to maintain a healthy balance of insect life, controlling diseases, and discouraging weeds. For the gardener, this means a healthier garden and less maintenance.

For more information about companion planting, check out the archive of the KidsGardening Webinar with Charlie Nardozzi on Ecological Gardening available on our Crowdcast Page at: <https://www.crowdcast.io/kidsgardening>. Another great resource is the book *Plant Partners* by Jessica Walliser.

Advanced Preparation:

- Gather all materials
- Create cooperative groups (if needed)
- Ensure technology is connected (if needed)
- Prepare necessary modifications/accommodations to ensure equitable access

Laying the Groundwork:

Take a field trip to a natural area or show students detailed photos of a natural area. Ask them to inventory the different kinds of plant and animal life they see. Depending on the time available and skill level of students, this can be a simple count/tally of all life they find, or you have them divide the count into general categories (plants, animals and fungi). Students can dig even deeper and try to identify each species.

Ask students to discuss the following questions:

Did our inventory uncover more or fewer living things than you were expecting?

How do you think having a diversity of species benefits different ecosystems?

What do you think life would be like if there were only one or two different types of plants and animals living in an ecosystem? Why would that make them vulnerable and the ecosystem fragile?

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What does biodiversity mean? Ask students to find and/or create their own definition of biodiversity.

Exploration:

1. Explain to students that, just like the natural areas they explored, gardens thrive when they are designed to include a diversity of life. Introduce the concept of companion plants using the background information above. Have students research individually, in groups or together as a class, examples of companion planting. Although there are many to choose from, two possibility companion planting concepts you may want to explore are:

Tomato Plant Companions:

Tomatoes are one of the most popular garden plants, but they can run into many challenges including insect and disease pests. Have students read the following articles about tomato companion planting ideas:

Tomatoes and Basil: An Analysis of the Allelopathic Relationship Between Basil (*Ocimum basilicum*) and Tomatoes (*Solanum lycopersicum*) as an Alternative to Fertilizer

https://commons.vccs.edu/student_writing/11/.

And/or

Tomato Companion Plants: 22 Science Partners for Healthy Tomato Plants, by Jessica Walliser:

<https://savvygardening.com/tomato-companion-plants/>.

Three Sisters Gardens:

Three Sisters Gardens grow three partner plants: corn, beans, and squash. This efficient planting scheme draws on the agricultural expertise and culinary traditions of various Native American peoples. In a Three Sisters Garden, corn stalks provide support for bean vines. Beans, like other legumes, form a mutually beneficial relationship with soil bacteria. These bacteria form nodules on the plants' roots that allow them to convert nitrogen from the air into a form that the bean plants can use, a process called "nitrogen fixation." As the roots of bean plants decompose after the crop is harvested (or if bean leaves and stalks are turned back into the soil after harvest), some of this nitrogen becomes available for other crops to use in coming seasons. Corn, which requires a lot of nitrogen to grow, benefits most from this nitrogen boost. The large, prickly squash leaves shade the soil which conserves moisture and prevents weed growth, as well as deterring animal pests. The three sisters also complement each other nutritionally, providing people with sources of both starches and proteins along with diverse vitamins and minerals.

To dig deeper, students may want to read an eloquent description of Three Sisters Gardens found in a chapter titled "The Three Sisters" on pp. 128 -140 of the book *Braiding Sweetgrass* by Robin Wall Kimmerer.

2. Ask students to design a garden with biodiversity in mind featuring companion plants. They can choose an existing space at home, school, or in the community for their design, or it can just be a dream garden design. This can be done as an individual or group project.

3. First they will need to select the companion plants they want to feature. They can use one of the ideas above, or research alternatives. If using an alternative, have students list the benefits each plant offers to its growing companions.

4. Next, ask them to research the growing needs and habits of each of the plants. How much space do they need? What kind of soil is best? How much sunlight do they need to thrive? Do they need any kind of supporting feature?

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5. If designing the garden for a real location, conduct a site analysis and consider if you want to plant in containers, raised beds, or in-ground beds. KidsGardening's article on [Designing and Placing the Garden](#) can help walk them through the design steps. If they are designing a dream garden, they can imagine and define the space they plan to use for the garden based on what type of location would best suit their chosen plants.

6. Ask students to find a way to visually share a companion plant garden design. There are many ways this can be done. For example, they can:

Create a poster that provides a visual of what the garden would look like from the ground using hand drawing or by cutting out pictures from seed catalogs.

Create a bird-eye view map using graph paper

Use a computer program to design and create their garden.

7. Beyond incorporating their chosen companion plants into their design, ask them to also consider and include other plants and features they can include to help increase the diversity in the proposed garden space.

8. Have students share their designs to the group or in small groups. Allow time for questions and answers and to fully explore all the benefits that come from having a diversity of plants in a garden space.

Making Connections:

After sharing their garden designs, ask students to dig deeper by posing the following discussion questions:

What would the world be like without diversity?

What are some of the threats to diversity currently facing our planet?

Branching Out:

The benefits of diversity in a garden run parallel to the benefits of diversity within humanity. By gathering and cooperating, people of different backgrounds and experiences can help enhance life experiences solve problems, and create a brighter future. Challenge students to think of examples of how diversity is beneficial in their everyday life within their school and community.

Related KG Resources

[Growing Garden Companions](#)

[Three Sisters Garden](#)

[Exploring Food Forests](#)

[Choosing Flowers to Welcome a Diversity of Pollinators](#)

[Encourage Pollinators and Beneficial Insects](#)

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