Activity: Lettuce Be Different

Grades K-6

Time:

Groundwork: 40 minutes

Exploration: 30 minute setup; 4 weeks ongoing observations

Making connections: Ongoing

Materials:

- **Seeds from three different lettuce varieties (e.g., red leaf, green leaf, romaine)**
- **Pots**
- **Potting mix**
- **Paper or notebook to make an Observation Journal**
- **Writing instruments**

Standards At-A-Glance

Florida Standards Met:

SC.K.L.14.3, SC.K.P.8.1, SC.1.N.1.1, SC.2.N.1.1, SC.3.N.1.1, SC.4.N.1.1, SC.1.N.1.2, SC.1.N.1.3 SC.3.N.1.3, SC.1.L.14.2, SC.2.N.1.5, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.P.8.3, SC.3.L.14.1, SC.4.N.1.6, SC.4.N.1.7, SC.4.N.1.8, SC.4.P.8.1, SC.5.N.1.1, SC.5.N.1.2, SC.5.N.1.5, SC.5.N.1.6, SC.6.N.1.3, SC.7.N.1.3, SC.7.N.1.5, SC.8.N.1.2, LAFS.K.W.1.1, LAFS.K.W.1.2, LAFS.K.W.1.3, LAFS.1.W.1.2, LAFS.2.W.1.2, LAFS.2.W.3.7, LAFS.2.W.3.8, LAFS.3.W.1.2, LAFS.3.W.3.7, LAFS.4.W.1.2, LAFS.4.W.3.7, LAFS.5.W.1.2, LAFS.5.W.3.7, LAFS.6.W.1.2, LAFS.6.W.3.7, LAFS.68. WHST.1.2, LAFS.K.SL.2.4, LAFS.K.SL.2.5, LAFS.1.SL.2.4, LAFS.3.SL.2.4, LAFS.4.SL.2.4, LAFS.5.SL.2.4, LAFS.6.SL.2.4, MAFS.K.MD.1.1, MAFS.K.MD.1.2, MAFS.K.MD.2.3, MAFS.1.MD.1.1, MAFS.2.MD.1.3, MAFS.2.MD.1.4

Next Generation Science Standards:

2-PS1-1. 1-LS4-1, 3-LS3-1

Overview

Students compare their own similarities and differences. They then grow and compare several varieties of lettuce plants to explore variations within the same type of plant.

Background

Living things compete with one another to survive and reproduce in a wide range of environmental conditions. Adaptations are features that help living things survive and reproduce in their particular environment. In the desert, succulent cactus stems have spines that keep thirsty animals away. Plants in tropical areas have little white hairs on their leaves to shield them from UV rays. Because there is such a wide range of conditions and potential roles to fill, an incredible diversity of life has evolved on Earth. No two dogs, people or lettuce plants are exactly alike. We all have behaviors and other characteristics that are special, unique and distinguish us from the rest of the bunch. In this activity, we will explore the subtle differences that exist even among closely related plants.

Making Sense of Diversity

Grouping things with similar characteristics helps us make sense of our world. More than 2,000 years ago, Aristotle divided living things into two categories — plants and animals. Today, many scientists distinguish five major groups, or kingdoms. One classification system used today is based on the work of Carolus Linnaeus, an 18th-century Swedish botanist. In this system, organisms are divided into a hierarchy of categories: Kingdoms — Divisions — Classes — Orders — Families — Genera — Species, with each successive category based on more specific structural similarities. For example, humans are animals with backbones and thus belong to the phylum Chordata, along with other animals with backbones, such as reptiles and birds. Today, technological advances allow us to look at biochemical and evolutionary ties. For example, we've learned that reptiles and birds share much closer genetic similarities than members of another phylum without backbones, such as sponges.

The Importance of Diversity

A healthy, resilient ecosystem results from the complex web of roles played by a diversity of organisms. Plants, for instance, supply food for consumers and help provide our atmosphere's gas mixture, which supports all life on earth. Animals die, decompose, and provide materials to support plant life. Bacteria recycle nutrients that help maintain healthy plant life. While there are many different kinds of living things in an ecosystem, they occupy particular niches', or roles, in that system, which reduce competition for resources. For example, some plants in an ecosystem have shallow roots, and some have deep tap roots, to extract water from the soil and anchor their above-ground mass to withstand strong weather.

Humans Depend on Diversity

Humans take advantage of natural genetic diversity in many ways. The first farmers planted, harvested, and saved their favorite seeds, thus purposely selecting for specific desirable qualities. All of our food crops reflect centuries of work by plant breeders. Many medicines originated with the traits of wild species, manipulated by humans. Recently, however, humans have begun to design crops to meet other needs, such as consumer tastes, nutrient values, or harvesting and shipping requirements.

The benefits of plant breeding do not come without tradeoffs. Some tomatoes, for example, have been bred for toughness to withstand mechanical packing and shipping, and have consequently lost flavor and appealing texture. We rely heavily on high performance crops, and this dependence makes us vulnerable. When only one variety of crop or strain of a variety is planted and then hit by a disease, for instance, the entire crop can be wiped out. If the people depend on that crop as a food staple, its loss can be a catastrophe — like the potato blight that led to the Irish Famine in the 1800s.

When we rely heavily on specialty crops, we often lose track of or discard other varieties. These lost varieties may have great medical or agricultural values. Once lost, this valuable genetic information can never be recovered.

Preserving Diversity

Some ways people can help preserve genetic diversity include setting aside areas representing major ecosystems to protect wild species in their natural habitats; preserving genetic information in seed banks; and moving organisms to captivity, e.g., botanical gardens, aquariums and zoos.

Selecting and planting heirloom seeds in a heritage garden, or participating in a seed-saving program to keep 'heirloom' seeds alive and growing, are other ways to preserve genetic diversity.

Groundwork

Objective: To identify and describe the different qualities that make each human unique.

1. Have students sit in a circle and play the Let Us Be Different game as follows: Have one student share one way she/he is the same as the person to her/his left. That student in turn should share one way she/he is the same as the person on her/his left. Continue once around the circle in this fashion, then switch and have each student tell one way she/he is different from the person to her/his right. Encourage students to think about ways they are alike and different that include how they look, what they do, and other traits that make them special. Specific traits, e.g., hair color, should be used only once.
2. After the game, have students consider how their lives might be different if people were all the same. For instance, ask: "What do you think a basketball game would be like if every player were a good defense player and nobody knew how to shoot well? What would the world look like if we all had green eyes? We've found that human beings can be alike in many ways and still have many differences. Is the same true for plants? Isn't any lettuce plant just like any other lettuce plant?"
3. Have students describe the kinds of differences they might find in any one type of plant, e.g., lettuce, tomatoes, or beans. Speculate and discuss the factors that may have caused these differences — naturally and due to plant breeding by humans.

Exploration

Objective: To identify and describe variations within species by growing and comparing different types of lettuce plants.

1. Give students three different types of lettuce seeds to compare and describe (careful; seeds are very small). Then have students plant the three varieties of lettuce in separate pots (peat pots can be used, to transfer seedlings to the garden, if planting in the cool season). Label each pot with the type of lettuce.
2. Place the pots outside in full sun.
3. Have the students create an Observation Journal for their gardening efforts.
4. As the plants grow, have students make and record regular observations of the lettuce in each pot in their Observation Journal.
5. As the plants are growing, share the background information with the students.
6. At the end of four weeks, have students complete the "Lettuce Be Different" record sheet, comparing each of the lettuce types.
7. Discuss findings. Ask: "How are all of the lettuce plants in the pots similar? How are they different? Are all the plants in any one container exactly the same? How are they different?" Compile the responses on a large class chart.
8. Bring in some store-bought lettuce for further comparison. Iceberg lettuce works well for this. Ask: "Where is this lettuce grown? How does it differ from the leaf lettuces grown and examined?"

Grouping things with similar characteristics helps us make sense of our world.

"Activity: Lettuce Be Different"

Enrichment

1. Write a haiku describing each type of lettuce.
2. Graph class responses to such questions as: Which lettuce is your favorite to look at? Which lettuce tastes best? Which lettuce would you rather have in your salad? Which in your sandwich?
3. Create a collage highlighting variations in one particular trait, e.g., different kind of human noses, dog fur, apple varieties, or bird beaks.

Extensions for Middle and High School

1. Harvest mature lettuce leaves from the soil surface and observe how each different lettuce type keeps growing. Record when it bolts (goes to seed).
2. Have students speculate about plant breeding. Cross pollinate flowers, anticipate results and grow seeds to determine genetic influences. Assess results compared to plans. Discuss challenges of plant breeding.
3. Grow and compare different varieties of bean plants. Graph the class taste preferences for pole versus bush bean, etc.
4. Call several local grocery stores to discover how many different varieties of lettuce they sell, and where each was grown. Graph results.
5. Harvest the seed from a hybrid variety of plant (e.g. tomato) and grow these out to fruit. How do the fruits resemble the parents and how are they different?
6. Invite a professional plant breeder or hobby plant breeder to class to discuss their work.

Additional Materials:

1. Florida Agriculture in the Classroom, Inc. has K-12 lessons searchable on its website by grade level, subject area and commodity at *www.faitc.org*.
2. Use the lesson "Banking on Seeds" from *Project Food, Land & People's Resources for Learning*. It can be obtained by attending a workshop.

A healthy, resilient ecosystem results from the complex web of roles played by a diversity of organisms.

"Activity: Lettuce Be Different"

Lettuce Be Different

Name _____

	Pot A	Pot B	Pot C
What do the *seeds* look like? (color, shape, size)			
What *color* are the *leaves*?			
How do the *leaves feel*?			
What *shape* are the *leaves*?			
How *tall* is the *plant*?			
How does it *taste*?			
What else do you *notice* about the lettuce?			

Lettuce Be Different Observation Journal

Name _____

Experimental Groups				
Time (Day/Date/Week)	**General Observations**			

Lettuce be Different

Sample Pre-Post Assessment

1. Greenleaf, Redleaf and Romaine are all:
   a. Types of lettuce
   b. Varieties of lettuce
   c. Species of lettuce
   d. Species of Aster, which includes lettuce

2. Lettuce is grown in Florida during the _____ season.

3. A genetic adaptation can occur (circle all that apply):
   a. In response to a changing environment
   b. Over several generations
   c. To better occupy a niche
   d. After a serious catastrophe, such as a drought

4. What is one way your garden can help preserve genetic diversity?

5. My favorite lettuce is _____, because _____.