Monocots and Dicots Lesson Plan

Curriculum connections

Plants: Anatomy, Growth, and Functions

Overall Expectations

Describe the major processes and mechanisms by which plants grow, develop, and supply various products, including energy and nutrition, needed by other organisms.

Specific Expectations

Understanding Basic Concepts

Describe the structure and function of the components of each of the leaf, the stem, and the root of a representative vascular plant (AT MUSEUM)

Differentiate between monocot and dicot plants by observing and comparing the structure of their seeds and identifying vascular differences between plants. (AT SCHOOL)

Preparation Time:

Seed preparation: overnight

Growing period: 3-4 days

Duration:

Seed investigation and `planting': 30 minutes

Final investigation and clean up: 30 minutes

Materials:

Bowls

Colander or strainer

Water

Paper towels

Corn seeds and beans (Lima or fava are really good for this experiment)

for Part One of this investigation, you will need one of each seed per student

for Part Two, you will need 5-10 of each seed per group or student.

Magnifying glasses (optional)

Toothpicks (one per student - optional)

Preparation:

1. Fill the mixing bowls with water. Place the beans in one bowl and the corn seeds in the other bowl and soak them overnight to speed up germination.
2. Before beginning the lesson, drain the beans and corn seeds in a colander or strainer.

Procedure:

Part 1 - Inside Seeds

As you work through this activity, stop along the way to talk about the different parts of a seed and their basic functions.

1. Introduce the terms cotyledons, monocotyledons and dicotyledons.
2. Provide each student with one corn seed and one bean seed.
3. Instruct your students to examine each seed. How are they similar? How are they different? Point out the scar on the side of the seed that shows where it was attached to the parent plant.
4. Have the students carefully remove the seed coat from the beans. Ask them why they think a seed needs a `coat'.
5. Demonstrate to the students how to pry the two parts of the bean apart with their fingers (a toothpick may make this easier).
6. Using the magnifying glasses (or just good, careful looking!), have the students observe the inside of the bean. What do they see? Point out the embryo and the food supply and discuss the basic function of both.
7. Compare the bean seed to the corn seed. Instruct the students to remove the seed coat from the corn seed. Can the corn seed be easily split in half? What is inside the corn seed? Can you locate the embryo and the food supply within the corn seed?
8. Which seed do you think is the monocot and which is the dicot? Why?

Part 2: Seed Germination

1. You may wish to have students work individually or in small groups for this activity.
2. Over the next few days, provide time for your students to monitor their seeds, adding water as required ensuring that the paper towels are kept damp.
3. Instruct your students to observe the jars each day, watching for changes in the seeds. What happens to the seeds? Which plant parts appear first?
4. Compare the seeds when the roots and shoots appear. How are they different? How many seed leaves does the corn have? How many do the beans have? Which seeds are monocots and which are dicots? Was your original guess (from Part One) correct?

Follow-up and Discussion:

1. Create diagrams of the corn seed (monocot) and bean seed (dicot). On the diagrams, label the seed coat, embryo, food supply and cotyledons.
2. Create diagrams of the corn sprout and the bean sprout. On the diagrams, label the roots, stem, and cotyledons.
3. Discuss the characteristics of monocots and dicots. How do the structures of these plants differ? How can we identify monocots and dicots by simply looking at the plants? Identify some common monocots and dicots.

Extension: Seed Food Supply

Through this extension, students investigation the importance of the food supply to the growth of a plant.

1. After soaking the beans overnight, select three equal-sized beans for this variation.
2. Place one bean into the plastic bag prepared with paper towel in the same manner as at the museum.
3. Using one of the remaining beans, carefully remove one half of the bean (one seed leaf) without harming the embryo. Place the seed leaf containing the embryo into the jar between the paper towel and the glass.
4. Finally, carefully cut the seed leaves from the remaining bean so that there is only half of one seed leaf still attached to the embryo. Place this seed between the paper towel and the glass.
5. Monitor the seeds over the next few days, adding water as required.
6. Which seed grows best? Why?

Resources:

Science Is. by Susan V. Bosak, Scholastic Canada Ltd. and The Communication Project, 2000.

Experiments with Plants: Projects for Home, Garden, and Classroom by Joel Beller, Arco Publishing, Inc., 1985.

Plant Biology Science Projects by David R. Hershey, John Wiley & Sons, Inc., 1995.

Botany: 49 Science Fair Projects by Robert L. Bonnet and G. Daniel Keen, Tab Books Inc., 1989.

Botany Projects for Young Scientists by Maurice Blefield, Franklin Watts, 1992.