Denver Urban Gardens School Garden and Nutrition Curriculum

What a Stem

Lesson

Goals

Students learn how materials are transported through plants by examining how stems and other objects conduct water.

Objectives

Students will consider and explore the forms and functions of stems by observing and comparing the transport action of plant stems and other objects.

Standards

Science: Life Science

GR.2-S.2-GLE.2

GR.5-S.2-GLE.1

Did you know?

Potatoes and gingerroot are actually stems and not roots.

Total Time – 45 minutes (15 minutes day one, 30 minutes day two)

Materials

- Pictures of plants and trees
- Assorted materials that might transport water (e.g. celery, carnations, wooden dowel, plastic straws, carrots, paper towel strips)
- Glass jars
- Food coloring
- Hand lenses

Method

Introduction (Day one, 15 minutes)

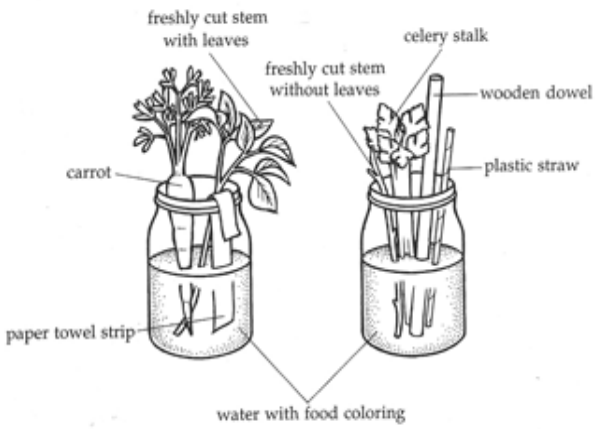
1. Show your students different plants or pictures of plants, including trees, and then point out the stem in each image. Explain to your students that just as each of their body parts have particular jobs to do, each part of the plant has special jobs to do too.

2. Have the students generate a list of the possible jobs of stems. List them on the board.
    a. Transports water, nutrients and the produces of photosynthesis
    b. Supports leaves, flowers and fruit
    c. Stores water (such as for a cactus)
    d. Can be used as a method of asexual reproduction in many plants

3. If students' ideas did not include the job that stems transport water, ask: *If you water the roots of a wilting plant, what happens to the plant? How do you think the water starts in the roots and ends up in the leaves?* Tell the students: *Although plant stems have several different jobs, during this activity we are going to focus mainly on the water-carrying job.*

4. Have the class answer the following question: *What will happen if we leave a plant stem and other objects in colored water overnight?* Have the class record their predictions.

5. Set up the following and let sit undisturbed for 24 hours.



Activity (Day two, 15 minutes)

1. Pull the items out of the colored water. Wash or blot off excess colored water from the objects.

2. Give each student (or group) an object and a hand lens to observe how the colored water traveled through the object. Have the students compare the heights the colored water reached.

3. Have the class answer: *How does what happened compare with your predictions?*

4. Have the students record their results by using colored pencils or crayons to illustrate the height the colored water traveled in each object. Ask: *What direction does the water seem to travel in the stems?*

Snack & Conclusion (Day two, 10-15 minutes)

1. Prepare a stem–based snack, which may include: celery, asparagus, broccoli or rhubarb. An easy stem recipe is included at the end of the lesson.

2. Journal or discuss one or more of the following questions:
   - Why do you think the wooden dowel carried the colored water as it did? (Hint: Where does wood come from?)
   - Why do you think the colored water did not rise in the plastic straw? What do you have to do to get your drink to rise in a plastic straw?
   - In plants, where do you think the materials inside the stem are going? From where do you think the materials in the stem are coming?
   - What do you think would happen to a plant if its stem were broken? How could you set up a test to find out?
   - How does the water you drink reach the rest of your body?
   - Do you eat stems? If so, which ones? How else do people use stems?

Assessment Tools

- Participation
- Critical thinking
- Journals

Possible Modifications and Extensions

- Turn this into a one-day lesson by presoaking all of the objects. Make sure to have samples of the objects before they were soaked.
- Compare the rate the colored water travels up the stems in light and dark conditions.
- Make tie-dyed flowers. Take a white carnation or rose and carefully slice the bottom of the stem lengthwise into multiple sections (2-4). Leave 3-5" of stem attached near the flower head. Put each section in a jar with different colored water. Let sit for two days. Have students predict what the flower will look like.
- Have a stem scavenger hung outside. Search for stems with different characteristics such as rough, thorny, flexible, green, large, etc.
- Grow some underground stems such as tubers (white potatoes), corms (crocus), bulbs (tulips, daffodils) or rhizomes (iris, ginger).
    - Plant some gingerroot in a 4" pot. Place a 1" piece of ginger ¾" below the surface of the potting mix. Keep moist and wait patiently for the grass like shoots to develop. Rub the leaves to find out if they have the same aroma as ginger.
    - Three different ways to plant a potato:
        - Fill a container halfway with soil. Lay the potatoes on the soil and cover them with 1" of soil. Water until slightly damp and place in a sunny warm place. In a week or so you should see leaves. After several weeks you may see some purple flowers too. If your container is large enough, you may also get little potatoes underground. When you dig up little potatoes make sure to show how they are extensions of the stems.
        - Put a potato in a clean jar so only the bottom stays wet. You may need to use toothpicks to hold it up. Eventually roots will sprout out of the bottom and stems and leaves will grow out of the top. Change the water once a week. If the plant does not start growing in two weeks the potato may have been treated so it will not sprout. Start over.
        - Use potatoes that have little white sprouts on them. Cut them into pieces so that there are three sprouts on each piece. Let them dry overnight. Fill an empty clean ½ gallon milk container with soil. Place this container in an old pie pan so the water does not leak all over. Plant the potato pieces under about 3" of soil. Put the cut side down and the sprouts up. Water until damp. This is how farmers plant their potatoes.

Sources

Lesson adapted from: *Plants Alive! Transport and Support* & *Gardening Wizardry for Kids*

A RESOURCE OF DENVER URBAN GARDENS
303.292.9900 | DIRT@DUG.ORG | WWW.DUG.ORG