

Moving Fluids in Plants: Experiments with celery

Annotation

Students will explore the vascular tissue of a celery stalk. The celery stalk serves as a model for the generalized plant. In Part I of the activity, students will use a dye to determine the location of the vascular tissues. In Part II of the activity, they will explore how light influences the rate of movement of water in the vascular tissues.

Problem: Can water travel through plant stems? Can we determine how a directed light source influences the rate at which water travels through plant stems?

Background Research

Read about the parts of a plant in a biology textbook. Especially look for xylem and phloem. Write three paragraphs about what you read. (Note: locate a specific website that has the information you wish to have them read, or identify a specific section of a text book or both)

Hypothesis

Based on your research and your experience with plants, why do you think water can travel through the plant stem? In this lab there are two specific hypotheses that you are going to test:

- a. First, plant tissues which carry water up (or down) the plant stem can be distinguished from those tissues which have other purposes.
- b. Second, the rate of water movement in the plant's stem will be changed as a result of the amount of light shining on the plant.

Amount of time

2 hours

Assessed GPS

SCSh9. Students will understand important features of the process of scientific inquiry.
SCSh5. Students will be able to communicate scientific ideas and activities clearly.

Materials:

Part I

250 ml graduated cylinder (plastic) or similar sized bottle/container
1 - 250 ml beakers
food coloring
Laboratory knife
Tap water

Part II

2 - 250 ml graduated cylinders (plastic) or similar sized bottle/container
2 – 250 ml beakers
2 colors of food coloring
laboratory knife
tap water
light source



MOVING FLUID IN PLANTS: EXPERIMENTS WITH CELERY PART I

Materials:

250 ml graduated cylinder (plastic) or similar sized bottle/container
1 - 250 ml beakers
food coloring
Laboratory knife
Tap water

Procedures:

1. Pour 100 ml of water into each beaker
2. Add three or four drops of food coloring to each glass. There is no need to add more coloring than four drops, but you should ensure that the color is not transparent.
3. Very carefully cut bottom of the stem while the stem is submerged to ensure that the vascular tissue is open.
- 4.. Let the stalk stand in the water for 1 hour.
5. Make a cross sectional cut across the celery approximately $\frac{1}{2}$ of the way up the stalk. Cut a small section of the stalk and observe under a stereomicroscope. Make a diagram which distinguishes the colored tissues from those without the food coloring. Why are some tissues colored and others not.

Data: Be sure to record your observations and inferences.

Conclusion: This is not optional. You must explain what you learned by doing this activity. Answer the question you were asked in the first part of the original problem statement (e.g., Can water travel through plant stems?). How does this activity provide a test of the first hypothesis? (e.g., plant tissues which carry water up (or down) the plant stem can be distinguished from those tissues which have other purposes). Can you make a statement as to how the water carrying tissues are different from those which do not carry water?

MOVING FLUID IN PLANTS: EXPERIMENTS WITH CELERY PART II

Materials:

2 - 250 ml graduated cylinders (plastic) or similar sized bottle/container
2 – 250 ml beakers
2 colors of food coloring
laboratory knife
tap water
light source

Procedures:

1. Pour 100 ml of water into each beaker
2. Add three or four drops of food coloring to each glass. There is no need to add more coloring than four drops, but you should ensure that the color is not transparent.
3. Very carefully cut bottom of the stem while the stem is submerged to ensure that the vascular tissue is open.
4. Let one stalk stand in the water under a light source and another stalk stand in the water in the dark, for 1 hour.
5. Make a cross sectional cut across the celery approximately $\frac{1}{2}$ of the way up the stalk. Cut a small section of the stalk and observe under a stereomicroscope. Make a diagram which distinguishes the colored tissues from those without the food coloring. Why are some tissues colored and others not.

Data: Be sure to record your observations and inferences.

Conclusion: This is not optional. You must explain what you learned by doing this activity. Answer the question you were asked in the first part of the original problem statement (e.g., Can water travel through plant stems?). How does this activity provide a test of the second hypothesis? (e.g., Is the rate of water movement in the plant's stem changed as a result of the amount of light shining on the plant.). Can you make a statement as to how the water carrying tissues are different from those which do not carry water?