

How Does Water Move Through A Plant?

Grades: K - 6

Set up: 1 hour ; Observation: 1 hour the next day



Lesson summary:

Have you ever wondered how water moves upward from the roots to the leaves of a plant? How does water get all the way up to the top of a tall tree? In this lesson, students will learn about how water moves through a plant.

What's the big idea? ?

- Water is constantly moving through plants through the xylem

Outcomes or purpose:

- Water moves through a plant through xylem
- Water helps plants to stand up straight

Teacher background:

How plants use water

Like all living things, plants need water. Water in the soil is absorbed by the roots and travels through the stems to the leaves. Water carries nutrients back and forth between roots and leaves. During photosynthesis, plant leaves need water, nutrients and sunlight to make their own food. Water also helps a plant to stay cool.

Water also helps support the plant by filling up the cells that make up the plant, so it can stand up straight. Too little water will cause the plant to wilt or droop.

Water has a long way to travel from the roots to the leaves. How does it do that? Plant stems have some very special cells called **xylem**. These cells form long thin tubes that run from the roots up the stems to the leaves. Their job is to carry water upward from the roots to every part of a plant.

Water moves up the xylem by a process called **capillary action**. Water molecules like to stick together. In capillary action, water is pulled up through the tubes because very tiny components of water, called molecules, are attracted to the molecules that make up the tube. The water molecules at the top are pulled up the tube, and the water molecules below them are pulled along because they are attracted to the water molecules above them.

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Another example of capillary action is a dry sponge sitting on a shallow plate of water. Look closely at the sponge. Can you see the holes? We know that water molecules are attracted to each other. What happens is that as water fills the tiny holes in the sponge, it continues to move upward filling more of the holes. Eventually the whole sponge becomes moist.

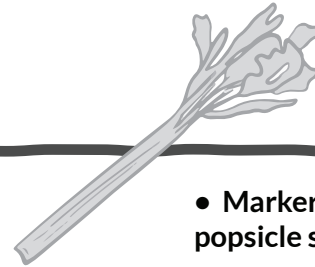
Water is constantly moving through plants.

When plants have more water in their leaves than they need, they get rid of this extra water through a process called **transpiration**. During transpiration, water evaporates from tiny holes in the surfaces of leaves into the air. These tiny holes are called stomata.

As water molecules evaporate from plant leaves, they attract the water molecules still in the plant, helping to pull water up through the stems from the roots. The combination of transpiration and capillary action delivers the water from the bottom to the top of a plant.

Materials needed:

- 1 clear glass or plastic cup
- 1 whole stalk of celery
- Food colouring in assorted colours
- Sharp knife
- Cutting board
- Water - warm or tepid is best
- Marker or popsicle sticks



Step by step instructions:

1.

Give each student a glass and a stalk of celery. Each student can mark their name on the glass with a marker or on a popsicle stick.

2.

Have each student fill the glass about three-quarters of the way to the top with water.

3.

Add drops of food coloring until the color of the water is dark (at least ten drops). Stir until the color is evenly distributed throughout.

4.

Cut about 2 cm off the bottom of the stalk of celery with the knife and place the celery in the cup with the leaves sticking up.

5.

Set aside one celery stalk – do not place it in water. Use that stalk to compare it to the ones in the coloured water mixture the next day.

6.

Check the stalk several times throughout the day. Observe how the stem and leaves are changing. Let the stalk sit overnight.

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Discussion questions

- What happened to your celery stalk overnight?
- How do you know that the water reached the top of the plant (celery stalk)?
- Remove the celery stalk from the cup and cut another centimeter off the bottom. What do you see?
- Look for small circles at the bottom of the stalk that are the colour of the food coloring you used. (These circles are xylem, the tubes that carry water up the plant.)
- Continue cutting the celery stalk at one cm intervals. Try to follow the path of the colored water all the way up the stalk of the celery to the leaves. How far did the water move up your celery stalk?
- Now look at the celery stalk that was not in a glass of water. How is it different from the other stalks? Is it rigid or floppy? Why do you think that is so?

Now that you're done, you can eat the celery!

Expand the learning:

Use the same directions but replace the celery with white carnations. Make a fresh cut about 2 cm off the end of each flower. Place one white carnation per student into glasses of water with food colouring. Leave one white carnation in plain water for comparison. The food colouring will change the colour of the flower petals while the white carnation stays white. Do this a day or two before Mother's Day and let each student take a flower home to their mother as a present.

