

Uphill Flow

Plant Drinking

What you need!

- Plastic Wrap
- Food colouring
- Glass
- Water

Trees are tall and yet they grow new branches and leaves far from their roots and the source of water. The formation of leaves, plant growth and the requirements of photosynthesis are all dependent on water. Most of the water a tree takes up is absorbed through the roots. Without a heart to pump water up against gravity, how does the tree make the water flow up from the roots to the leaves? The answer is a bit sticky.

What you do:

1. Fold a piece of plastic in half and use it as a tube. Cut the bottom edge of the plastic wrap to make it even.
2. Pour a few drops of food colouring into a glass half-filled with water.
3. Place one end of your tube into the glass of water and wait a while.
4. Examine the tube carefully. The coloured water should climb up the tube above the level of the liquid in the glass.



Ask yourself

- How does the water climb up the plastic tube?
- Is water sticky?
- Why is the level in the plastic tube higher than the level in the glass?
- Name something that depends on this action.

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What did you find out?

Water always flows downhill, right? Usually this is the case, but not always. Through a process known as capillary action water can actually defy gravity. Capillary action depends on really tiny tubes and the stickiness of water.

When water is poured into a container, its adhesive properties, or stickiness, make it rise up onto the sides of the glass. Adhesion also causes water droplets to stick to the tiles in your shower.

When a glass is filled with water, the adhesion force creates something known as a meniscus line. Look for yourself and you will notice that water along the edges of a glass is just a little bit higher than in the middle of the glass. The meniscus line is shaped a little like a flattened U. The meniscus shows that water sticks to some surfaces better than it does to other water molecules.

When our plastic tube is placed in the water, it looks as though more water is being sucked up by the capillary action than what is normally seen with a glass of water. In fact, it is the same volume, it is only that the size of the tube is smaller, so the water lifts higher. The tighter the tube, the higher the water rises. Try folding the plastic tube in half, and then see how high the water rises.

Trees and other plants use the adhesion force of water and capillary action to move water up from their roots. The tubes inside plants are microscopic - they allow water to rise much higher than in our experiment. This way, water can move many metres against gravity, without the need for pumps or muscles.

Specific Learner Expectations (SLE)

Grade 4 Topic E: Plants.

SLE 2: Identify and describe the general purpose of plant roots, stems, leaves and flowers.

SLE 4: Recognize that plant requirements for growth vary from plant to plant.