



VICTORY GARDENS

Lesson and Activity Suggestions for Grades 3-5

Watering Your Garden

*Mary, Mary, quite contrary,
How does your garden grow?
With silver bells and cockle shells
And pretty maids all in a row.*

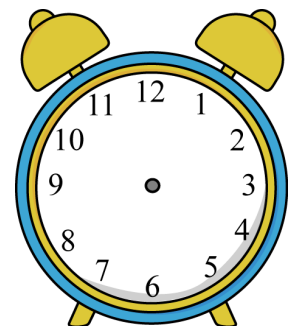
The very best way to water your garden is to hope that it rains. But Mother Nature doesn't always send rain right when we need it. So it's up to the gardener to give your plants a drink. From start to finish, water is the most important thing for your garden. Water is essential to plants. Most plants are composed of up to 90% water. Water is necessary for cell structure, stability and growth.

Too little water will wilt or kill your plants. You may see them turning yellow or brown and slump over. Too much water is just as bad, leading to leaf diseases or root rot, snails and slugs, or other bad things. If you over water your plants, you may see them turning yellow or brown, but they will still be standing up. Irregular watering can stress your plants, too, leading to low productivity or bolting (growing too big, too quickly). Therefore, if you want your garden to thrive, you're going to have to pay attention to how often and how much you water your vegetables.



When to Water the Vegetable Garden

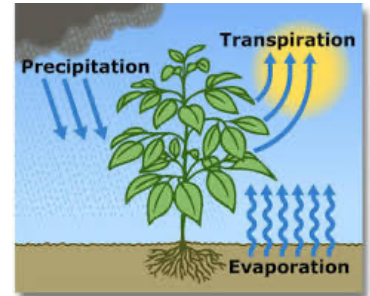
The best time to water your vegetables is in the early morning hours, somewhere around 6 - 10 am. This is the time of maximum growth for your plants and it gives the soil and roots time to absorb the water fully. When it gets hot, your plant loses water to evaporation. If you water in the evening, the water will sit on the roots overnight, while they "sleep" and that can lead to mildews, rusts and other diseases. **Add two sets of hour hands on the clock and color between them to show the best time to water your plants.**



You need to focus your water on the roots of the plants. That is where the plant drinks. Just make sure the top 6-12" of your soil is damp, not muddy, and watch your plants for any signs of over or under watering.

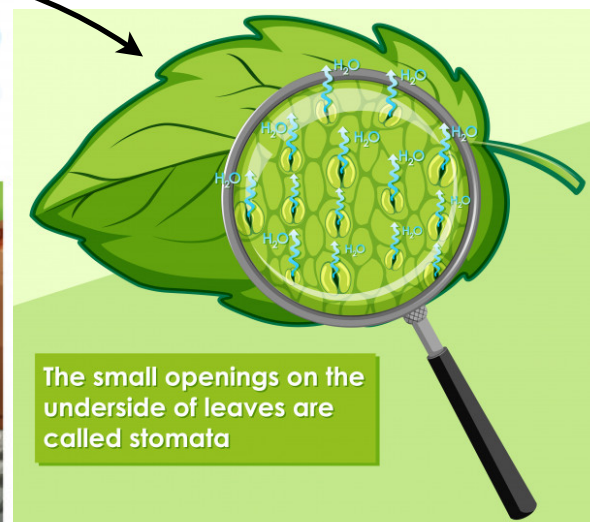
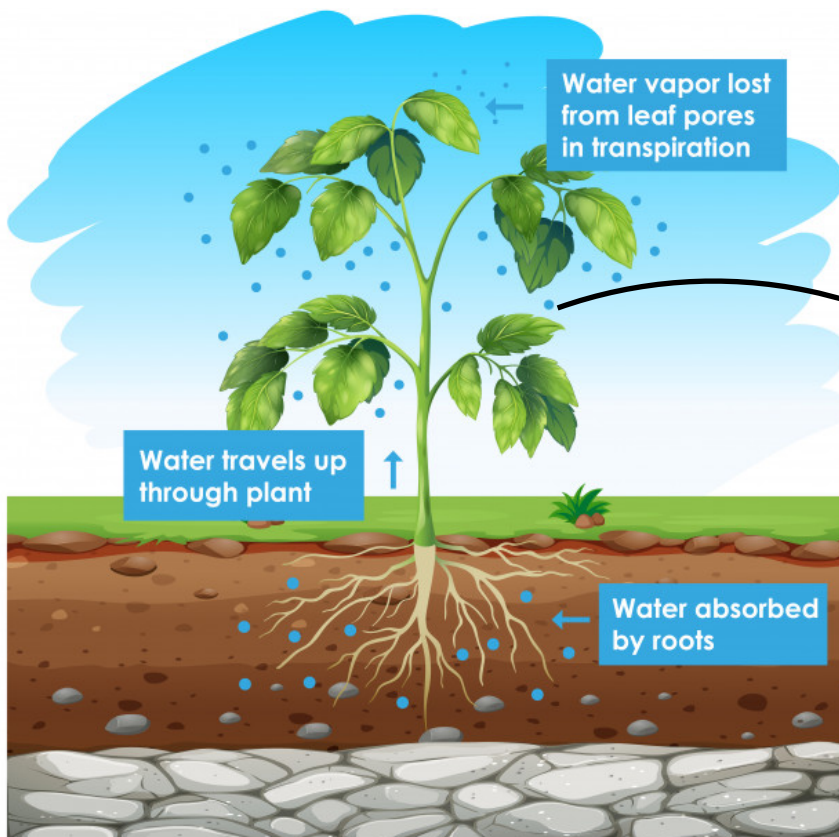
How Does a Plant Drink Water?

In the simplest terms, plants have straws that run from their roots up and out through their leaves. The plant sucks the water moisture out of the soil and up through its body. When it reaches the leaves, it evaporates into the air. If you remember when we talked about the water cycle, you know that the evaporated water vapors then collect in the sky and become clouds, the clouds produce precipitation and the cycle continues. Here is a new word for you to add to that cycle: **TRANSPIRATION**.



You learned in an earlier lesson that when water turns to vapor from the ground or bodies of water, it is called **evaporation**. But you are now ready to learn that there is a more specific term to use when plants absorb water through the roots and then give off water vapor through pores in their leaves. That process is called **transpiration**.

Here's one more new word for you: **STOMATA**. The pores on the leaves that give off the water vapor are called **stomata**. You are getting smarter every day! Your plants thank you!



So How Do Plants Drink Up the Water?

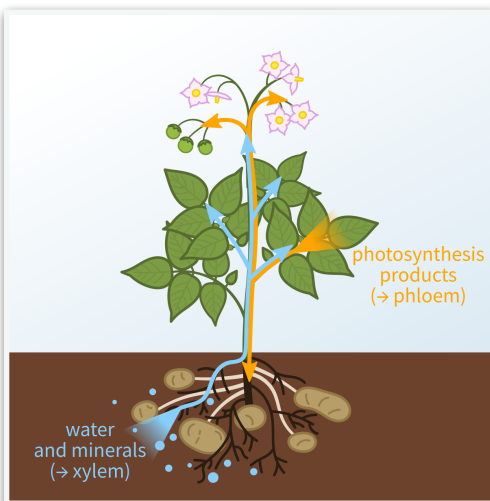
Just like we have veins that circulate blood around our body, plants have their own types of vascular and circulatory systems. **Veins - Vascular Circulation = Circulatory = Circulate**

The main parts you will hear a lot about are called **XYLEM** and **PHLOEM**.

The **xylem** of a plant is the system of tubes that circulates water and nutrients from the roots up through the stem and into the leaves. If your leaves need water and they are 100 feet above the ground, it is time to put the xylem into action! Xylem tissue dies after one year and the plant develops a new layer. This can easily be seen when a tree is cut down. Counting the number of xylem rings in the trunk tells you its age. These xylem rings also give the plant support.



Phloem cells are laid out end-to-end in a vascular system throughout the entire plant. They work to transport the nutritious sugars created in the leaves during photosynthesis to other parts of the plant. It can be observed in many trees when they are cut or a hole is drilled into them and sap "bleeds" out. What happens is that the cut went through some of the tree's phloem, allowing the sugary sap to run out. Similarly, if one of your veins gets a cut, blood will run out. Did you know that the sap from maple trees is collected and turned into the maple syrup we love on our pancakes!



Phloem carries nutrients **from the leaves** to other parts of the plant; it can flow both up and down the plant.

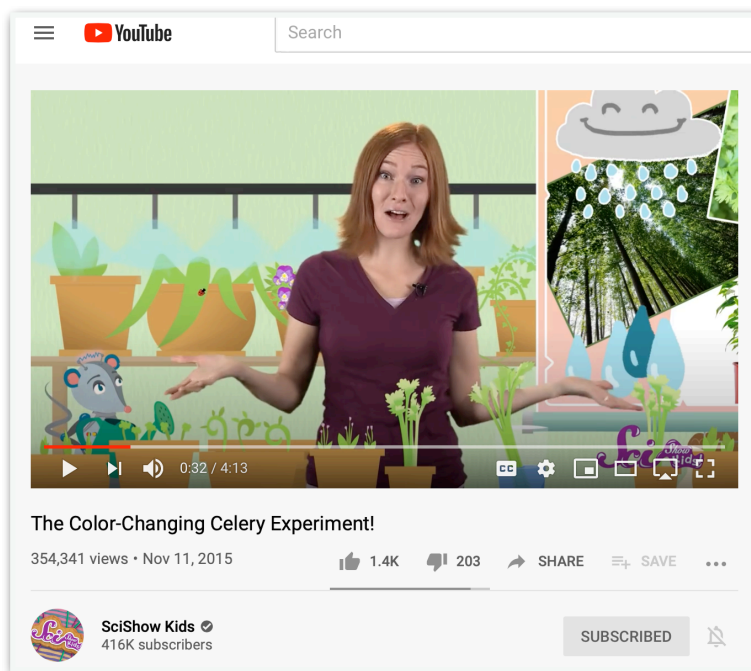
Xylem carries nutrients upwards **from the roots**; it can only flow up the plant.

What have you learned? Fill in the correct words below.

1. The process of water moving through the plant system is _____.
2. Leaves give off water through small openings or pores called _____.
3. I can find out how old a tree is by counting its _____ rings.
4. Plant sugars are transported from leaves throughout the plant by _____.
5. The tubes that carry water and nutrients from the roots to the leaves are called _____.
6. When the _____ of a plant is cut, I may see its sugary sap bleed out.

Seeing is Believing

In this experiment you will be able to see the xylem works! Watch this YouTube video titled "The Color-Changing Celery Experiment!" By SciShow Kids. It can be found at <https://www.youtube.com/watch?v=Klug9Fouu3s>. Then, do the simple experiment yourself!



Materials Needed:

- Cup(s) of water
- Food dye(s)
- A head of celery stalks

Directions:

1. Fill cups with water and food coloring, as if you were going to color Easter eggs.
2. Cut off the ends (white part) of stalks of celery.
3. Place them in the cups with the top (leaf end) up and the newly-cut stalk down in the colored water.
4. Let it sit overnight.
5. Observe and record your findings!

Want more rainbows in your life?

When Mother Nature sends rain, we often can see a rainbow once the sun comes out. Try this experiment to make your own cloud and rainbow. <https://www.growingajeweledrose.com/2019/02/rainbow-rain-experiment.html>.

You can also learn about different liquid densities through this rainbow experiment. <https://www.education.com/science-fair/article/rainbow-in-a-jar/>.



You can also try this experiment with Napa cabbage leaves.

