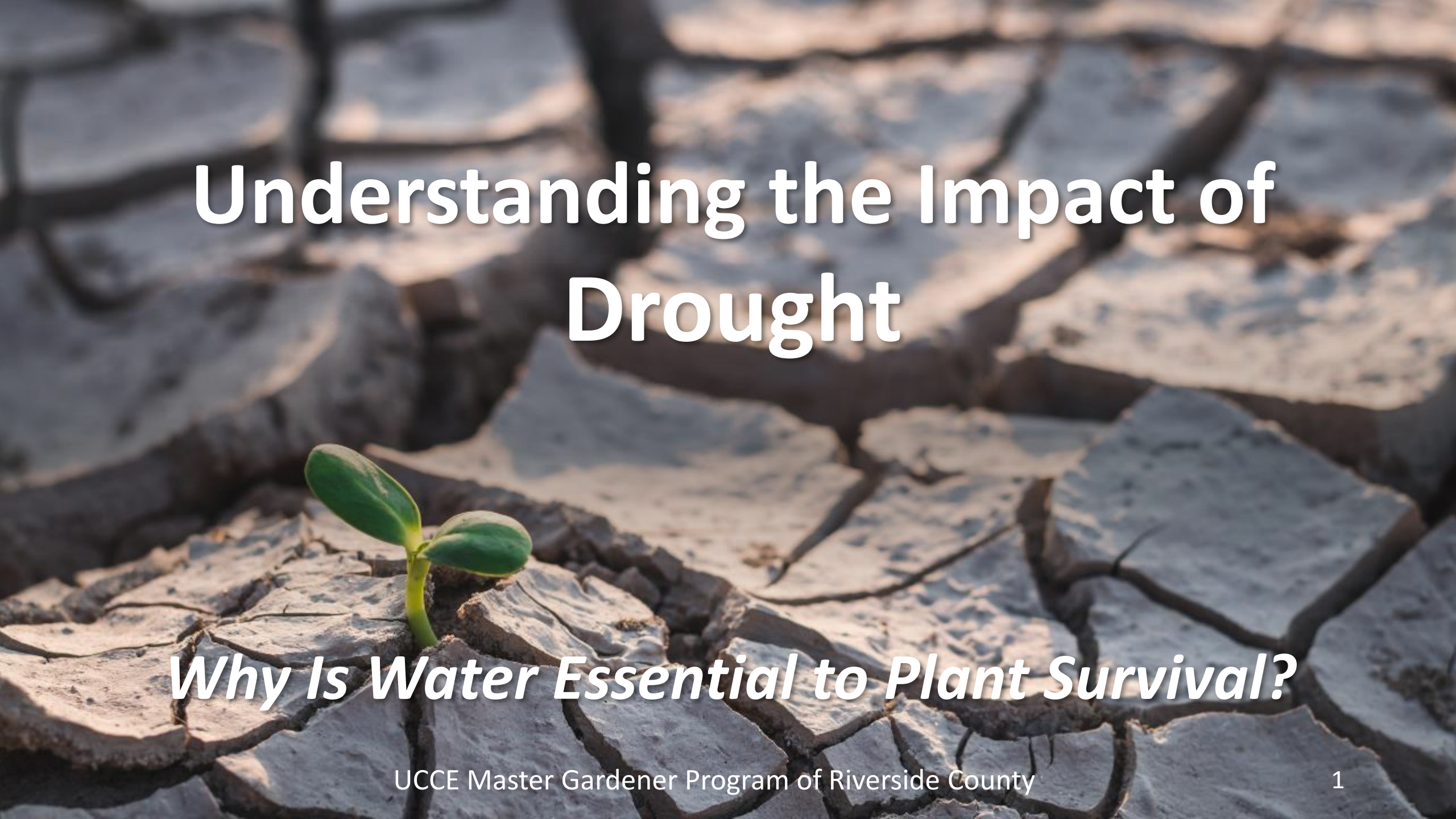
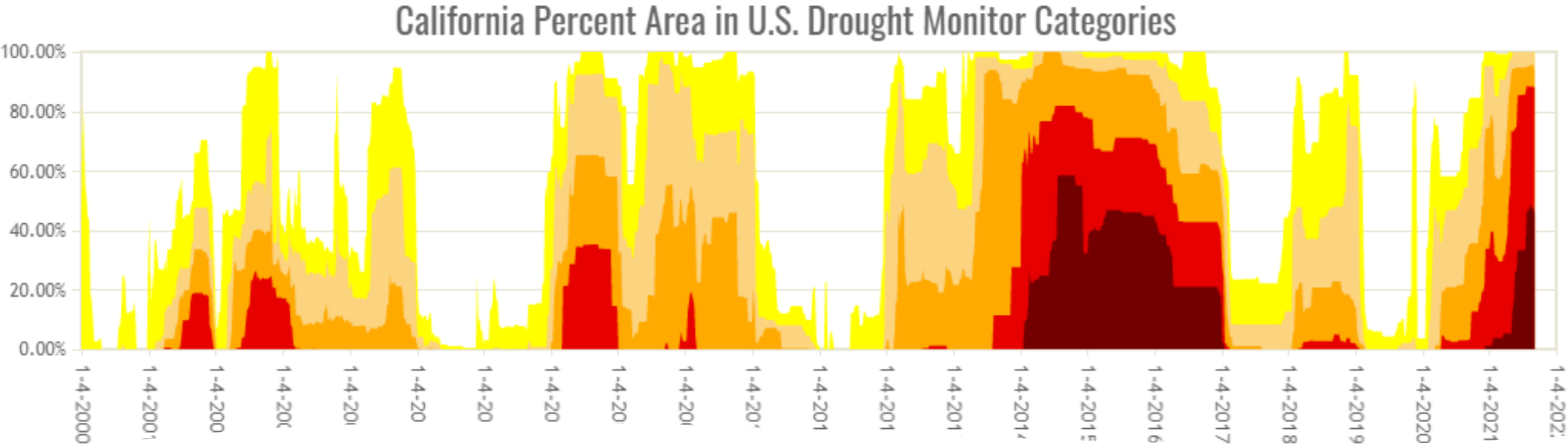


Understanding the Impact of Drought

Why Is Water Essential to Plant Survival?



Why Is this Important? California is Experiencing an Extended Period of Drought

- Throughout its history, California has experienced many droughts.
- During the last ten-plus years the state has experienced an increase in the frequency of droughts.
- **As the most populous state in the nation and a major agricultural producer, drought in California can have a severe economic and environmental impact**.

Begin Your Investigation on Water and Drought By Taking the *"Virtual" Water Quiz*

Virtual water is the water we aren't aware we are using.

- All the food we eat and all the products we use need water to grow and/or be manufactured.
- This short seven question quiz will give you a better understanding of **how much total water** is needed for things we take for granted in everyday life.

Most Plants are Composed of About 90% Water

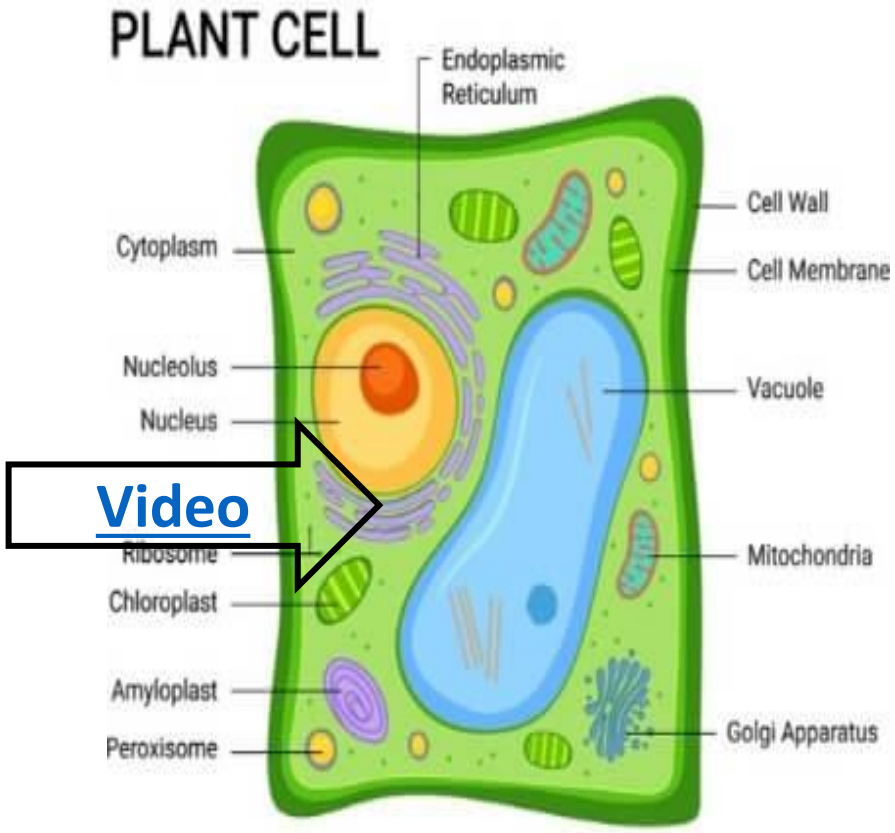
Water is used by plants in four essential ways:

- Structure
- Photosynthesis
- Translocation
- Transpiration

Understanding Plant Structure

Plants do not have a skeleton. Instead, plant structure comes from the pressure of the water in their cells which enables them to grow and maintain rigidity.

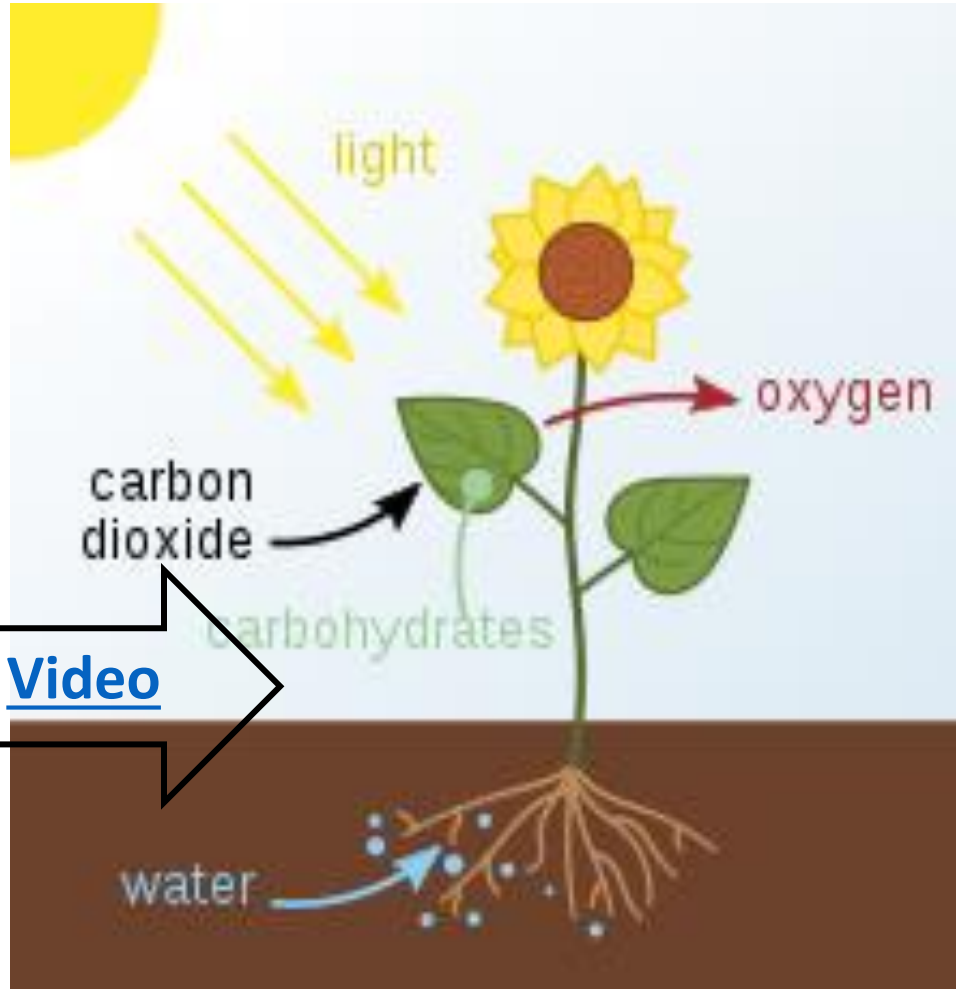
- Within each cell is the **vacuole**, a space filled with water that ensures the cell maintains its shape.
- If the plant receives enough water, the vacuole keeps the cell walls at the right pressure and gives the plant its strength.



Understanding Photosynthesis

Photosynthesis is the process by which plants produce the energy they need to survive and grow. Water is central to the process.

- Photosynthesis uses the energy from the sun to create energy in the form of sugars (carbohydrates).
- For the molecules of sugar to form they need carbon dioxide which they absorb from the air, and hydrogen from the water in the plant.

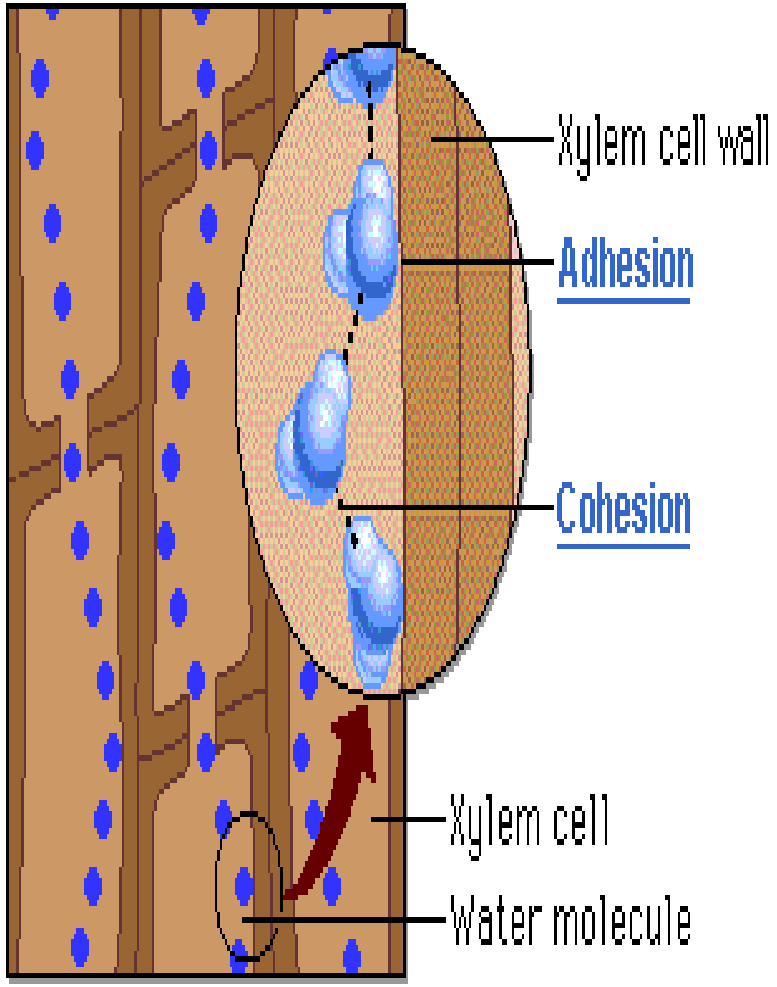


Understanding Translocation

The movement of water through the parts of a plant is called translocation.

The plant absorbs nutrients in a solution form; so adequate water in the soil is essential for good plant growth.

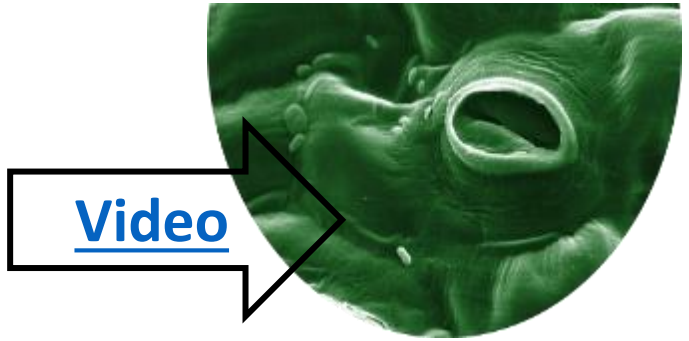
- Soil nutrients are taken up by the roots in a water solution and moved by a process called **capillary action.**
- Capillary action takes places in the plant's **xylem** system, in long hollow chains of dead xylem cells.

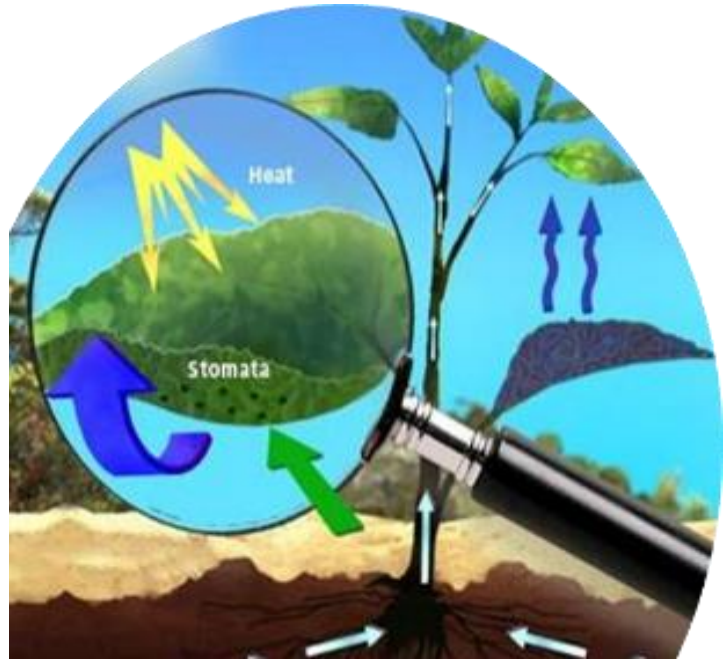


Understanding Transpiration

The driving force behind water movement in plants is evaporation through the leaves, which acts like a magnet pulling water up the plant's "plumbing" system.

- Because water is evaporating from a living surface, it is called **transpiration**.
- During photosynthesis, water evaporates from the surface of the leaves. This occurs when **stomata**, a kind of pore on leaves releases water along with oxygen into the atmosphere and takes in carbon dioxide.



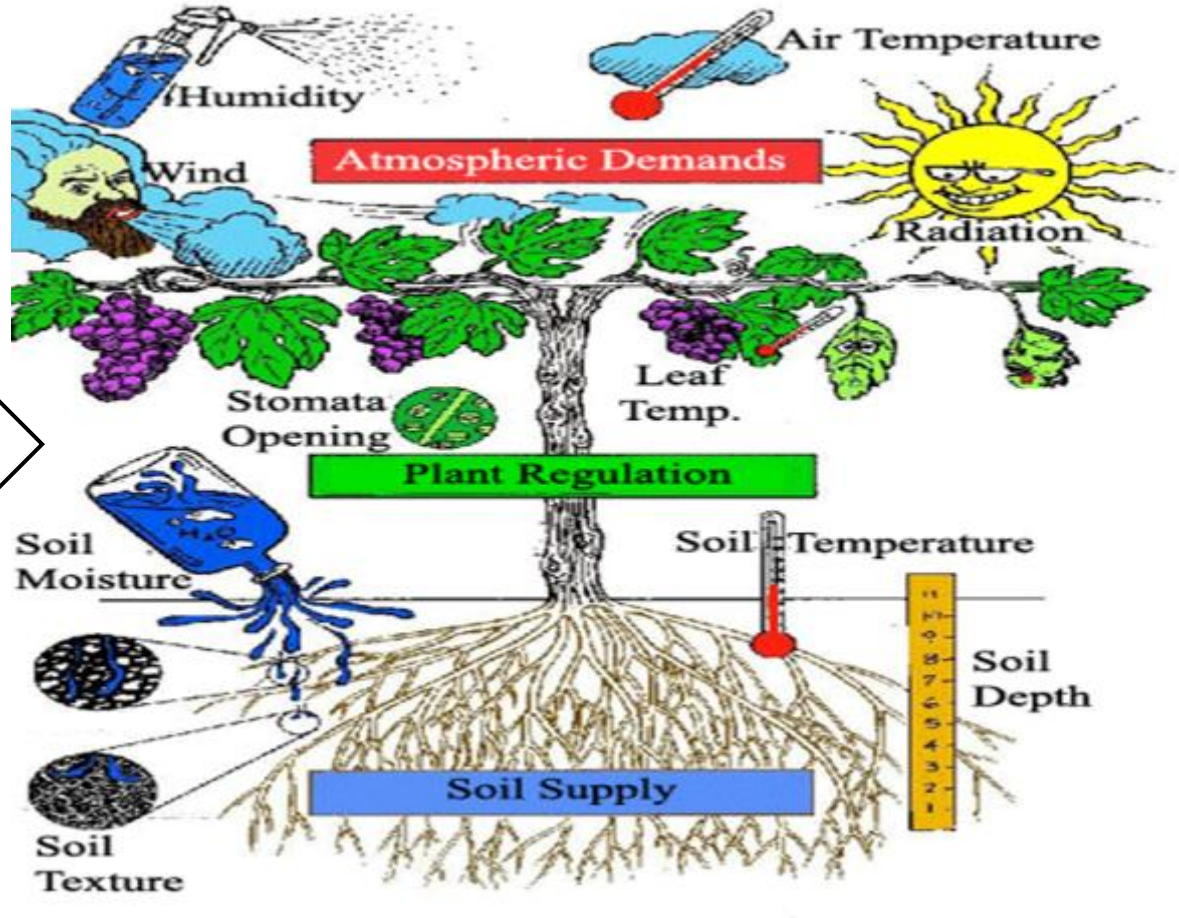


The Amount of Water a Plant Needs is Affected By Environmental Conditions

This occurs through a process called evapotranspiration (ET) which is driven by the following environmental factors:

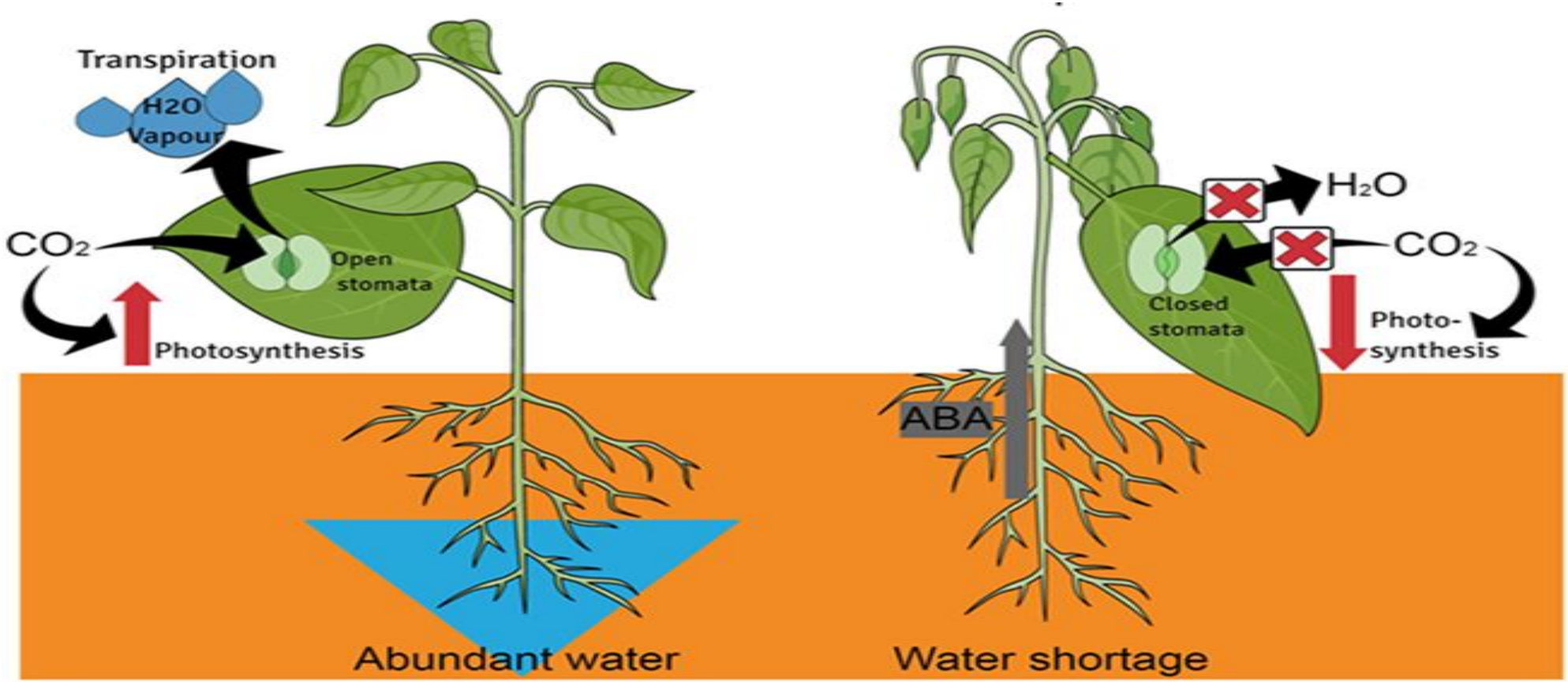
- Solar Radiation
- Temperature
- Relative Humidity
- Wind speed

Video



One or more of these factors will affect plant water use.

Without Adequate Water a Plant Will Wilt And Could Ultimately Die!



How Can Plants Receive Adequate Water in a Drought?

Scientists are researching and developing solutions to reduce the impact of drought on plants. Explore a science pathway to learn about how plants can be successfully grown in a drought.

To access a science pathway, close this PowerPoint lesson and open your choice of the Agronomist or Botanist PowerPoints.