SMARTSCAPE
A Training Program for Landscape Professionals™

Smartscape for Homeowners Associations

Class #2 Plant Science, Irrigation & Pruning

TUCSON WATER
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THE UNIVERSITY OF ARIZONA Cooperative Extension

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Learning Objectives

After participating in the HOA Program Class #2, participants will be able to:

1. Summarize basic plant science as it relates to plants, soil, and water
2. Discuss the importance of organic matter and how to use it properly
3. Explain what drip irrigation is, and its benefits and shortcomings
4. Review the basics of hydrozoning and seasonal watering schedules
5. Recognize common drip irrigation mistakes and troubleshoot
6. Describe best pruning practices for desert-adapted plants
7. Recognize common pruning mistakes

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Plant Science

(Plants, Soil, Water)

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Plants, Soil & Water

- Biological Plant Processes
- Water in the Plant
- Water in the Soil
- Soil Characteristics



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Leaves

- Photosynthesis
- Respiration
- Energy storage
- Regulate water use and gas exchange



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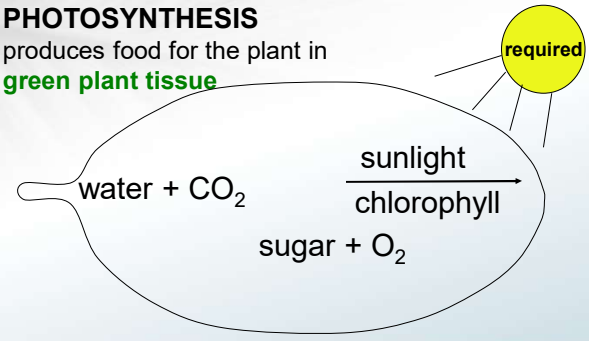
PHOTOSYNTHESIS
produces food for the plant in
green plant tissue



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RESPIRATION

makes energy available for the plant

no light required

$$\text{Sugar} + O_2 \longrightarrow CO_2 + H_2O + \text{Energy}$$

Requires oxygen

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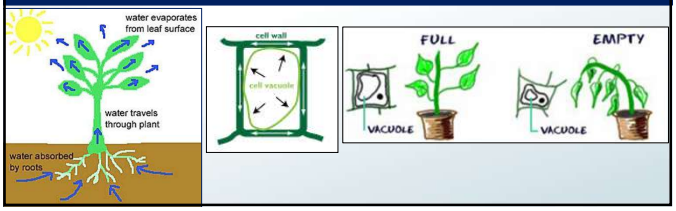
Role of Water in Plants

- *Moves minerals and other molecules*
- *Major component of plant cells*
- *Gives structural support through turgor pressure in leaves*
- *Cools plants through transpiration*



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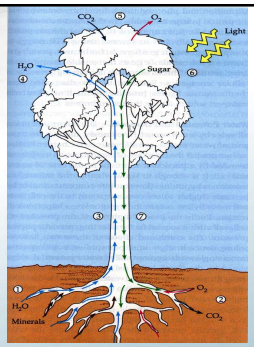
Transport in Plants

Water and minerals move upward in **xylem**

Sugars move in the **phloem** from the source (where they are produced to the sink where they are used).



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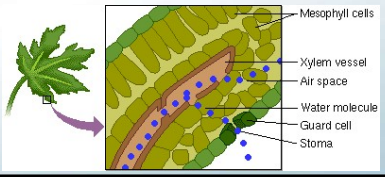
Transpiration

- Loss of water as water vapor through stomata in leaves.
- Water diffuses from high humidity in leaves to low humidity of air.
- Transpiration pulls more water from the xylem.



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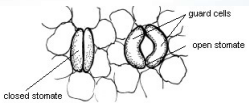
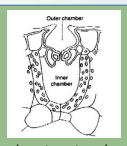
Stomata regulate

- gas exchange (CO_2 moves into and O_2 out of the leaf)
- water loss (water vapor moves out of the leaf)

http://images.fineartamerica.com/images-medium-large-5/stomata-of-lavendula-dentata-sem-power-and-syred.jpg



stomata on lower leaf surface



sunken stomata reduce water loss

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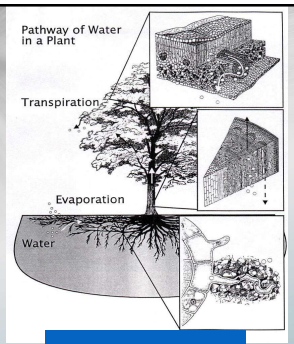

Water vapor moves through stomates into the atmosphere

Upward movement through xylem, driven by transpiration demand (*cohesion*, *adhesion*)

Uptake through root hairs (*osmosis*) from low to high concentration

Water movement

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Leaves

1. Capture and conserve light energy through the process of **photosynthesis**.
2. Take up carbon dioxide for photosynthesis and release oxygen for use in **cellular respiration**.
3. Store conserved energy in 'food' molecules - **sucrose and starch**.
4. Control water use and leaf temperature through **transpiration**.

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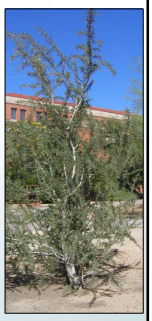
Stems

- Provide physical structure
- Contain water/photosynthate transport system



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Characteristics of Desert Soils

- Low organic content (<1%)
- Low N content
- High Salinity
- Excessive Caliche
- Rapid decomposition of organic material when moisture is present

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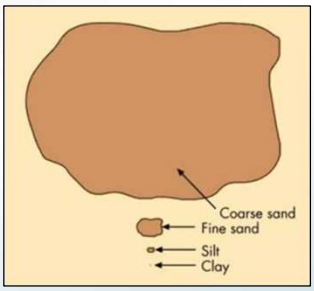
Soil Particle Size

Sand 0.05-2.0mm
Silt 0.002-0.05 mm
Clay < 0.002 mm



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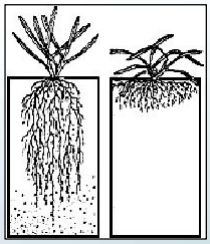
Depth of Soil

- Depends on age and structure of soil
- Is a permanent feature
- Soil may be shallow, depending on how the location was developed
- If you have shallow soil, or a layer of fill, find tolerant species



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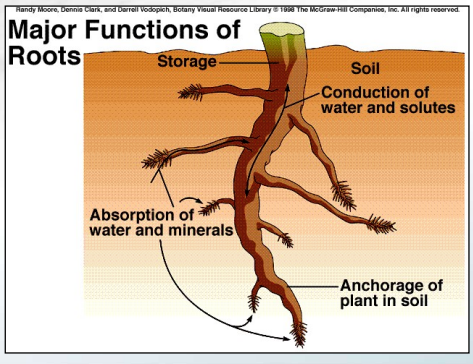

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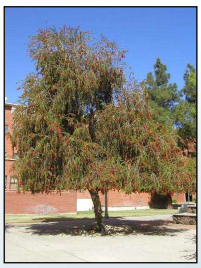
Root Depth

Turf, groundcover, bedding plants 6”-12”

Shrubs 12”-24”



Trees 18”- 36”

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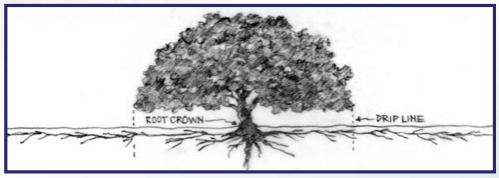
Root Systems of Trees



1.5 to 3 times as wide as canopy with most in top 2’ to 3’ of soil

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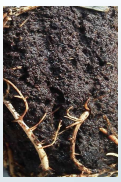
Organic Matter in Soil

- Arid soils naturally contain < 1% organic matter
- Do Not Add Organic Matter into Backfill
- As a general rule, only add organic matter as a top dressing
  - As top dressing, 3-4 inches of organic matter
    - Improves air space, drainage in heavy soils, reduces evapotranspiration, mitigates temperature changes, improves soil microbe populations



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Soil Microorganisms

- Living components of soil consume organic matter
- Include algae, bacteria, fungi and more
- Require oxygen, water and nutrients
- Provide nutrients for plants
- Plant specific, naturally occurring
- NO FERTILIZER NEEDED for native plants because they are supported by native soil microorganisms

http://warnercnr.colostate.edu

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Content Developed/modified by:

Juan Barba, Micaela Machado, David Sanabria, Jeffrey Gilbert, David Kopek, Carianne Funicelli, & Dominika Heusinkveld

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