Water in the Garden

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The Science: Soil/Media & Water Relations

• Water is held in pores (spaces) between soil/media particles.
• Water and air occupy the same pore spaces.
• Moisture is critical for a healthy soil/media.
• All organisms including soil microbes need water and air to grow and thrive.

**Figure 8.5**
The total volume ($V$) of a growing medium is made up of the volume of solids ($S$) and the volume of pore space ($P$). Percent pore space:

$$P = \frac{P}{V} \times 100$$
The Science: Water Availability

• Gravitational Water – Water in large soil pore spaces which drains freely.
  – Not available for plant growth
• Capillary Water – Water held in medium pore spaces.
  – Most available for plant growth
• Hygroscopic Water – Water held between the smallest soil particles.
  – Not available for plant growth
Field Capacity and Permanent Wilting Point

• These two terms refer to the soil moisture status.
• Field Capacity is the water in the soil immediately after free drainage of the gravitational water in the soil/media.
• Permanent wilting point is when the capillary water is used up and only hygroscopic water is left in the soil.
• Available water is the level of water in the soil/media between field capacity and permanent wilting point.
Wise Irrigation’s Goal

• The goal is to maintain the available soil water between the permanent wilting point and field capacity.
• Applying too much water at one time wastes water to gravity and leaches nutrients from the soil.
• Applying water too frequently limits root access to oxygen by keeping pores spaces saturated.
• Check your soil before you water to see if it needs it.
How do you know if your soil needs water?

• Two common ways to know when to water;
  – Feel the soil (best), or
  – Look at the plants

• Dig into the soil about three to four inches and try to work it into a ball.
  – If the ball barely holds together or falls apart the soil/media needs water.
  – If the soil ball holds together and doesn’t break apart, you don’t need to water.

• If the plant is beginning to wilt, time to water.
Ways to Conserve Water

• Water early in the day and apply water directly to the soil. Both reduce loss to evaporation.
• Increase the soil/media’s organic matter. This increases the soil/media’s water holding ability.
• Apply mulch to the soil/media surface.
  – Cools the soil and reduces water loss to evaporation.
  – Reduces weeds and their competition for water.
  – Apply 2-4 inches deep.
• Plant windbreaks, these reduce water loss due to transpiration from constant winds.
Methods of Watering/Irrigation

• Hand, sprinkling can or with hose (with or without nozzle).
  – Both are time and labor intensive.
  – Allow for more time to inspect plants.

• Sprinklers
  – High evaporation rates, Potential for spreading disease, May water nonplant area.

• Soaker or Spray hose or Drip Irrigation
  – All apply water directly to soil root zone, water/labor efficient and may be automated
Some Pictures
Soaker Hose or Spray Hose

- Soaker hose is a porous hose that can be connected to a garden hose and laid out along the base of the plants under the mulch.
- It allows water to slowly seep out along its length, spray hose are similar but have small holes that water sprays out of.
  - Ideal for plants that are planted close together.
  - Often made of recycled tires
  - Are cheaper and easier to install than drip irrigation.
  - Not recommended where plants are far apart since you don’t want to water the area between plants.
Drip Irrigation Components

• Control Valve

• Filter

• Distribution Line

• Drip Line