Water in the Garden

Frank Cruz, Roland Quitugua, Mark Acosta,
Duane Dominguez and Bob Barber

University of Guam, Cooperative Extension Services
Agricultural & Natural Resources

United States Department of Agriculture
National Institute of Food and Agriculture

CHL **Children's Healthy Living Program** for Remote Underserved Minority Populations in the Pacific Region
Alaska · American Samoa · Federated States of Micronesia · Guam · Hawai'i · Marshall Islands · Northern Mariana Islands · Palau

1

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.

STRUCTURE AND PORE SPACE

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
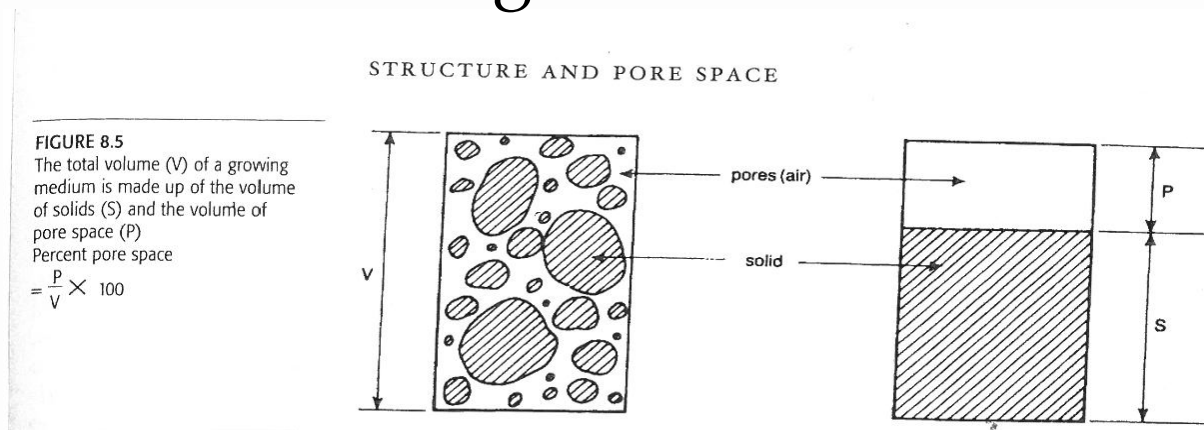$= \dfrac{P}{V} \times 100$

pores (air)

solid

V

P

S

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

CHL Children's Healthy Living Program for Remote Underserved Minority Populations in the Pacific Region
Alaska · American Samoa · Federated States of Micronesia · Guam · Hawai'i · Marshall Islands · Northern Mariana Islands · Palau

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

Water Availability

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

CHL Children's Healthy Living Program for Remote Underserved Minority Populations in the Pacific Region
Alaska · American Samoa · Federated States of Micronesia · Guam · Hawai'i · Marshall Islands · Northern Mariana Islands · Palau

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 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

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.

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

CHL Children's Healthy Living Program for Remote Underserved Minority Populations in the Pacific Region
Alaska · American Samoa · Federated States of Micronesia · Guam · Hawai'i · Marshall Islands · Northern Mariana Islands · Palau

Some Pictures

![USDA logo] United States Department of Agriculture National Institute of Food and Agriculture

CHL **Children's Healthy Living Program** for Remote Underserved Minority Populations in the Pacific Region
Alaska · American Samoa · Federated States of Micronesia · Guam · Hawai'i · Marshall Islands · Northern Mariana Islands · Palau

Recap

- Water is essential for plant growth and plant production

- When you think of water availability, think of water in a sponge

- Water your plants as needed
  - You don't want to see your plants starting to wilt