Master Gardeners Irrigation
Today we’ll learn about:

• Sources of irrigation water: culinary vs. secondary water
• Matching available water to soils and plants
• Determining when it’s time to irrigate
• Methods of irrigation
Where will you get your water?

- Where will your water come from?
- When or how often will your get your water?
What do you need to know before you start to irrigate?

- What plants do you want to grow?
- Do you have enough available water to support the plants?
- Are your soils appropriate for growing the plants?
What do you need to know before you start to irrigate?

- How much time and money do you have?
Where do plants get their water from in the root zone?

40% EXTRACTION HERE

- 30%
- 20%
- 10%
Plant rooting depths vary
Before you pick a crop, consider the soil:

- What is the capability class of the soil?
- What are the slopes and aspects?
- How deep is the soil?
- Does it have adequate drainage and rooting depths?
- Is compaction an issue?
Composition of a loam soil

- Mineral: 50%
- Water: 20-30%
- Air: 20-30%
- Organic: 5%
Soil texture

How does it feel in your hand?

Loam is a combination of all these

Clay feels sticky when wet

Silt feels silky smooth when wet

Sand feels coarse and gritty
Water spreads differently in different soil textures.

- **CLAY**: 9 – 14+ feet spread
- **SILT**: 5 – 9 feet spread
- **SAND**: 2.5 – 5 feet

2.5 – 5 feet

5 – 9 feet spread

9 – 14+ feet spread
Soil texture and drainage

Coarse Texture
- Sand

Medium Texture
- Silt Loam

Fine Texture
- Clay Loam
The water available to you

• Will you have water during dry years?
• Can you use your water more efficiently?
• What does your water cost?
Are you using an existing system, or starting over?

• Your flexibility may be limited with an existing system but costs will be lower

• Starting over allows you to carefully match soils, plants, and water availability with irrigation systems, but can be costly

• New irrigation systems may save time, money, or water
When is it time to irrigate?

- Rule of thumb: when the amount of water holding capacity is at 50% - but that’s hard to tell!
- If your plants are showing stress, then irrigation is overdue
  - Look for wilting or grasses that don’t spring back up when stepped on
The Look and Feel Method
Look and feel method

Clay, clay loam, or silty clay loam at 25-50% moisture.
Irrigation is overdue

Clay, clay loam, or silty clay loam at 50-75% moisture.
Will need to irrigate soon
Look and feel method

Sandy loam or fine sandy loam at 25-50% moisture.

Irrigation is overdue

Sandy loam or fine sandy loam at 50-75% moisture.

Will need to irrigate soon
Using evapotranspiration data to schedule irrigation
C. Watering
Utah lawns require about two inches of water each week in mid-summer.
• During the cool spring and fall, this may drop to 1 to 1 1/2 inches per week.
Most homeowners apply twice as much water to their lawn as they should.
• By following a simple guideline, homeowners can cut summer water use on lawns by at least one-third.
• First, measure the sprinkler output. Use six straight-sided cans (at least 3 inches deep) located at different distances from the sprinkler head.
• Turn the water on for 30 minutes. Measure the sprinkler output by averaging the amounts in the six cans. Your amount will be in terms of inches in 30 minutes.
Measuring Sprinklers
Second, measure the depth of water penetration with a long screwdriver or steel rod. Push it into the soil in several places in the watered lawn. The rod or screwdriver will be harder to push in dry soil than in damp soil.
• Measure the depth of the easy push. You now know how deep the water penetrated into the soil, the amount of water used in inches, and how long it took to put the water on the lawn. Ideally water should penetrate 10 to 12 inches.
Screwdriver method
• Third, determine how frequently the lawn needs water each week.
• If the lawn requires 1.5 inches each week and you applied one-half inch in 30 minutes which watered to a depth of ten inches, you need to water three times each week.
If you applied one-half inch in 30 minutes and water penetrated only 2 1/2 inches, you need to apply enough water to wet the soil to a depth of 10 inches.
The can method for measuring uniformity – a low cost approach
• This means you need to water for two hours (1/2 hour = 2 1/2 inches; 2 hours = 10 inches).
• The best time of day for applying water is during the morning or evening hours. Water pressure is generally best in the morning hours.
• Automatic sprinkler systems should be reset for different water outputs in May and September to save water.
• Symptoms of a lack of water in a lawn include foot printing, darkened or blackish areas, and lawn browning.
Footprinting can be determined by walking across a lawn and watching to see how long it takes for footprints to disappear. If the grass has had adequate water, footprints will hardly be noticed.
• If moisture is limiting, the grass will be very slow to stand back up. The blackened grass areas need to be watered immediately. If not, they will be brown the next day.
Blackened areas will usually yellow even if water is applied, and they indicate that the area has been without water for too long.
Irrigation water quality

• Does your irrigation water contain trace elements that may affect plant growth?
• Is the water salty?
• What are other users doing that might affect your water quality?
Salt-affected soils

UNCE, Reno, NV
Irrigation systems - advantages and disadvantages

- Flood
- Drip
- Sprinkle
Flood irrigation
Components of a flood irrigation system
Wild flood irrigation
Gated pipe
Reducing return flows
Ditch maintenance

• Dredging and redigging
• Weed and vegetation control
• Opening and closing of gates
• Who will do it, and what will it cost?
Trickle or drip
Drip irrigation
Lateral wheel lines
Sprinklers

UNCE, Reno, NV
Portable handlines
Applying water uniformly
Improving uniformity

- Monitor your system during irrigation – check for leaks or clogging of screens.
- Look for areas that remain too wet or too dry and adjust your irrigation system.
- Check sprinkler system pressures and nozzles to make sure they are adequate.
- Consider system upgrades.
Irrigation Systems Summary

• Know your sources of irrigation water
• Know your soil type
• Monitor soil moisture
• Improve efficiency of your delivery system when possible
Summary

• Adjust rate of water application to avoid runoff
• Know your labor availability
• Match your goals for your land to the irrigation system you select
HOMEWORK

- Practice the Look and Feel Method for determining irrigation on your soils on your property.
- Inventory your irrigation system, both existing and proposed; use the Irrigation Check List for Landowners Activity Sheet to note your findings and plans for the future.
- Check the uniformity of your sprinkler system, using any of the methods discussed in this lesson.
Drip Irrigation Systems
Drip irrigation systems only drip; anything else is not drip irrigation
Drip irrigation systems were originally designed for farms; they were later adapted to landscapes.
Two Types of Drip Irrigation

- Spot Drip (emitter)
- Garden Row (tapes or hoses)
Drip Irrigation

• Saves water
• Has precision application
• Is easy to automate
• Reduces costs
• Reduces disease problems
• Maximizes yields
Drip Irrigation

• Requires clean water
• Operates on low pressure
• Works well with mulch
• Is very convenient
LAWN AND GARDEN IRRIGATION

USU Extension Service Master Gardeners Class
Larry Sagers
Extension Horticulturist
Salt Lake County landscapes need 1 1/2 inches of rain or irrigation water per week at the hottest part of the growing season. Less is required during spring or fall.
Water loam or clay loam soils twice per week, with 3/4” applied slowly each time watered.
Sandy or gravelly soils will not retain as much water per irrigation and must be watered more often. Apply 1/2” of water every other day.
Calculating water needs:

- Per ft$^2$, 12" x 12" x 1 1/2"/231 in$^3$ p/ gallon = 1.25 gal./week or .623 gallons (10 cups) twice per week.
Calculating water needs:

• Per 1000 ft$^2$, 1.25 x 1000 = 1,250 gal./week or 625 gal. twice per week.
Calculating water needs:

- For a drip irrigated zone 9" wide x 100 long: 9" x 100' x 'L2''/ft. x 2'' deep/231 = 93.5 gal./week or 47 gal. twice per week or 27 gal. every 2nd day
Calculating water needs:

- For a double row drip irrigated zone 18' wide x 100' long: $18'' \times 100' \times 12''/ft. \times 2''$ deep/231 = 187 gal./week or 94 gal. twice per week or 53 gal. every second day
Irrigation Scheduling with Drip Irrigation

- Garden Irrigating Time (Hours and Minutes)
- Area Watered One 9" wide zone/drip tube
  One 18" wide zone/ drip tube (a)
- Flow Rate 1 gal/min/1001 1/2
  gal/min/lool 1 gal/min/100' 1/2 gal min
  1001
Area Watered
Flow Rate
(a) For loam or clay loam soils only; do not use for sandy or gravelly soils. Plant a row of vegetables 6" on each side of drip tube.
(b) Can cause stem end rot in tomatoes in clay or clay loam soils if used during fruiting season.
(c) Do not use this schedule. Entire zone will not get watered.
Measurements

• Area of a circle = 3.14 x R x R
• Volume of a cylinder = 3.14 x R x R x depth
• Gallons of water = 3.14 x R x R x depth / 231
• 1 gallon = 231 cubic inches