Watering Your Landscape

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Landscape Irrigation:

What Determines Water Use in a Landscape?
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What Determines Water Use in a Landscape?

1. Growing environment
   - Climate - hot, cool, dry, humid, cloudy, windy
Landscape Irrigation:

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   - Climate - hot, cool, dry, humid, cloudy, windy
   - Plant exposure - sun, shade
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment
   - Climate - hot, cool, dry, humid, cloudy, windy
   - Plant exposure - sun, shade
   - Surroundings - other plants, hardscape
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment
2. Types of plants
   - Trees
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment

2. Types of plants
   - Trees - on a canopy area basis, they can use significantly more than turfgrass.
Plant Water Use:

- Measure evapotranspiration (ET).

Evaporation from the soil

+ Transpiration from the plant
Where do you get ET estimates?
### Historical ET estimates:

#### Olive historical ET - inches during period

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Real-Time Weather Monitoring:

- Measure evapotranspiration (ET).
- CIMIS weather stations predict the ET of pasture grass (Reference ET = ET₀).
CIMIS
CALIFORNIA
IRRIGATION
MANAGEMENT
INFORMATION
SYSTEM
Accessing CIMIS data:

- Go through the Department of Water Resources
  
  www.cimis.water.ca.gov

- Univ. of CA IPM website:
  
  www.ipm.ucdavis.edu
Welcome

CIMIS Overview

The California Irrigation Management Information System (CIMIS) is a program in the Office of Water Use Efficiency (OWUE), California Department of Water Resources (DWR) that manages a network of over 120 automated weather stations in the state of California. CIMIS was developed in 1982 by the California Department of Water Resources and the University of California at Davis to assist California’s irrigators manage their water resources efficiently. Efficient use of water resources benefits Californians by saving water, energy, and money.

CIMIS Data Uses

Since the beginning of the CIMIS weather station network in 1982, the primary purpose of CIMIS was to make available to the public, free of charge, information useful in estimating crop water use for irrigation scheduling. Although irrigation scheduling continues to be the main use of CIMIS, the uses have been constantly expanding over the years. At present, there are approximately 6,000 registered CIMIS users from diverse backgrounds accessing the CIMIS computer directly. It is estimated requests for CIMIS information on the WWW average about 70,000 per year. There are also many secondary suppliers of CIMIS weather data, such as other web sites, radio, newspapers, consultants, and local water agencies.
March 4-5 Conference on IPM for Public Agencies

UC SAREP-UC IPM Grants Available for Educational Events

ABOUT UC IPM
Including 2001 Annual report

HOW TO MANAGE PESTS
- Management and identification of plant diseases, insects, mites, nematodes, weeds
- Pests of agricultural crops, floriculture and ornamental nurseries, and commercial turfgrass - Pest Management Guidelines
- Pests of home and landscape - Pest Notes
- Weed photo gallery - photos and descriptions of weeds

Weather data
- Degree-days - run models and calculate degree-days
- Model descriptions
- Plants, pests, and beneficials - crop diseases - more
- Special projects on the Web
- Citrus thrips damage estimator. - ant ID key. - more
Weather monitoring:

- Measure evapotranspiration (ET).

- Weather stations predict the ET of pasture grass (Reference ET = ET₀).

- Convert the reference ET (ET₀) to your plant’s ET (ETₖₑₚ) using a crop coefficient (kₑ).
Determining Crop ET:

Crop ET = Reference ET \times \text{Crop Coefficient}

\[ \text{ET}_{\text{crop}} = \text{ET}_o \times k_c \]

Crop Coefficient for Olives \((k_c) = 0.8\)
Irrigation scheduling example:

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<th>Almonds</th>
<th>Walnuts</th>
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Available at http://anrcatalog.ucdavis.edu/SoilWaterIrrigation/8212.aspx
Irrigation scheduling example:

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<th>Max Air Temp (°F)</th>
<th>Min Air Temp (°F)</th>
<th>Avg Air Temp (°F)</th>
<th>Max Rel Hum (%)</th>
<th>Min Rel Hum (%)</th>
<th>Avg Rel Hum (%)</th>
<th>Dew Pt (°F)</th>
<th>Avg wSpd (MPH)</th>
<th>Wnd Run (miles)</th>
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## Olive water use example:

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<th>$k_c$</th>
<th>$\text{ET}_{\text{olives}}$ (in.)</th>
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<td>0.80</td>
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$$\text{ET}_{\text{crop}} = \text{ET}_o \times k_c$$
Landscape Irrigation:

Tree water use example (walnuts):

- 20-foot diameter (10’ radius) tree, midsummer

Tree area = $3.14 \times (radius)^2 = 3.14 \times (10)^2 = 314 \text{ ft}^2$

$ET_o = 0.25 \text{ in/day} \quad k_c = 1.0 \text{ (e.g. walnuts)}$

$ET_{tree} = 0.25 \text{ in/day} \times 1.0 = 0.25 \text{ in/day}$

\[
\frac{0.25 \text{ in}}{\text{day}} \times \frac{\text{ft}}{12 \text{ in}} \times (314 \text{ ft}^2) \times \frac{7.48 \text{ gal}}{\text{ft}^3} = 49 \text{ gal/day}
\]
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment

2. Types of plants
   - Trees - on a canopy area basis, they *can* use significantly more than turfgrass.
   - Turfgrass - cool season (kc=0.8), warm season (kc=0.6)
Landscape Irrigation:

Turfgrass water use example:

- Warm season grass
  Area = 314 ft$^2$
  $ET_o = 0.25$ in/day $k_c = 0.6$ (warm season grass)

$$ET_{tree} = 0.25 \text{ in/day} \times 0.6 = 0.15 \text{ in/day}$$

$$0.15 \frac{\text{in}}{\text{day}} \times \frac{\text{ft}}{12 \text{ in}} \times (314 \text{ ft}^2) \times \frac{7.48 \text{ gal}}{\text{ft}^3} = 29 \frac{\text{gal}}{\text{day}}$$

(Walnut water use was 49 gal/day)
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment
2. Types of plants
   - Trees - on a canopy area basis, they *can* use significantly more than turfgrass.
   - Turfgrass - cool season, warm season
   - Stand-alone, smaller plants (shrubs, etc)
     - Wide range of water use, but water use is a function of their canopy size
     - Can save water if only water the plants, not the bare ground.
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment
2. Types of plants
3. Irrigation system
Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment
2. Types of plants
3. Irrigation system
   - Can the irrigation system provide *just the right amount* of water to all the plants in the landscape? Without wasting any?
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What Determines Water Use in a Landscape?

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   - Can the irrigation system provide *just the right amount* of water to all the plants in the landscape? Without wasting any?
   - Want to apply water only to those areas where plants can take it up.

*Efficiency*
Turfgrass Irrigation:

- Design
- Operation
Turf Design from an Irrigation Standpoint:

- Curves are hard to irrigate - rectangular shapes are easier.
Turf Design from an Irrigation Standpoint:

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- Small / narrow shapes are hard to irrigate.
Turf Design from an Irrigation Standpoint:

- Curves are hard to irrigate - rectangular shapes are easier.
- Small / narrow shapes are hard to irrigate.
- Slopes are harder to irrigate.
Sprinkler Design:

- Standard sprinkler spacing is “head-to-head” coverage.
  - Closer spacing = higher application rate = runoff?
Sprinkler Design:

- Standard sprinkler spacing is “head-to-head” coverage.
- Too many sprinklers on a line means poor pressure = poor coverage.
Sprinkler Design:

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- Keep track of where the pipelines are.
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Sprinkler Design:

- Standard sprinkler spacing is “head-to-head” coverage.
- Too many sprinklers on a line means poor pressure = poor coverage.
- Keep track of where the pipelines are.
- Error on the side of more valves / stations.
- Error on the side of using larger pipe.
  - Smaller pipe does not increase pressure.
Sprinkler Design:

- Standard sprinkler spacing is “head-to-head” coverage.
- Too many sprinklers on a line means poor pressure = poor coverage.
- Keep track of where the pipelines are.
- Error on the side of more valves / stations.
- Error on the side of using larger pipe.

- Make sure the sprinkler “pops-up” above the grass.
Turfgrass Irrigation Management:

- Try to avoid daily irrigations.
  - Odd/even watering requirements.
Turfgrass Irrigation Management:

- Try to avoid daily irrigations.
- Irrigate in the early mornings.
Turfgrass Irrigation Management:

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Turfgrass Irrigation Management:

- Try to avoid daily irrigations.
- Irrigate in the early mornings.
- If there are brown spots, don’t just increase the run time.
- Adjust your controller for changing water needs.
  - Smart controllers?
Summary: How do you get by on less water?

- Change your landscape plant selection
  - Go from high water users (lush trees & turfgrass) to lower water users.
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Summary: How do you get by on less water?

- Change your landscape plant selection
  - Go from high water users (lush trees & turfgrass) to lower water users.
- Become a more efficient irrigator
  - Easier to be efficient with drip irrigation.
- Combination of the two is often the best
  - Low water use landscape irrigated with drip irrigation.
Questions?

ROSE IS ROSE

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www.anrcatalog.ucdavis.edu
Lawn Watering Guide for CA: Pub. 8044
Drip Irrig. In the Home Landscape: Pub. 21579

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