

Watering Your Landscape

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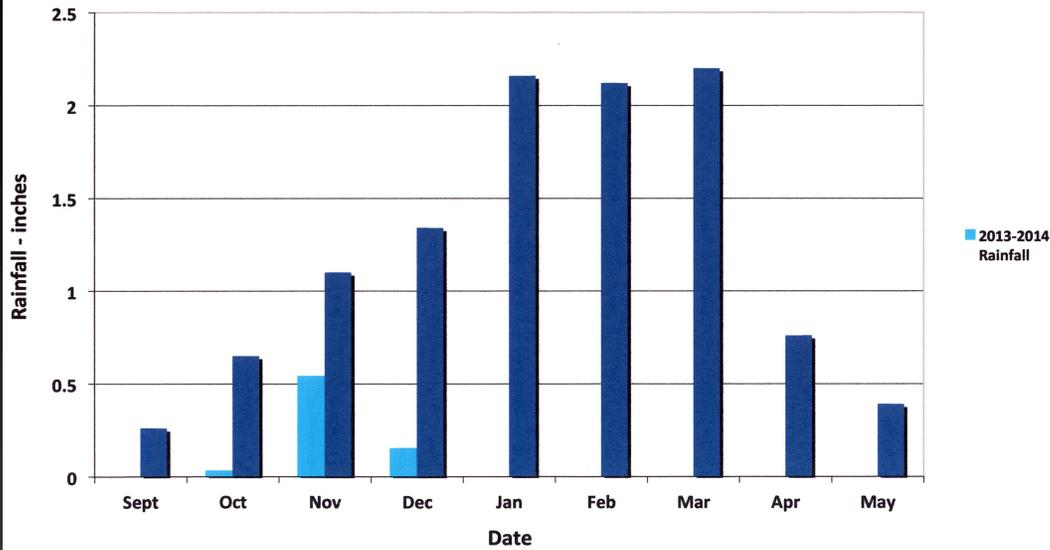
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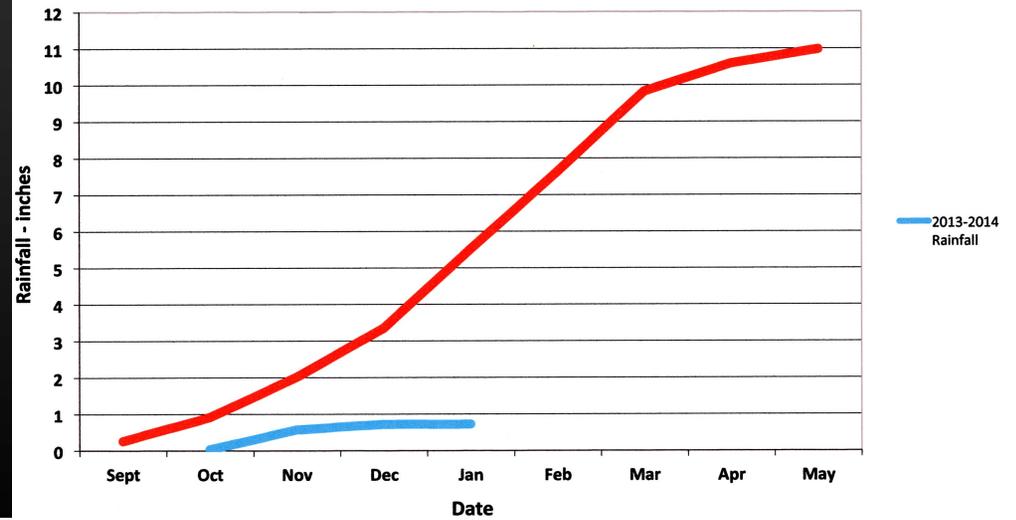
Presentation available at: **<http://ucanr.org/schwankl>**

**Rainfall - Fresno, CA
2013-2014 vs. Average**



Precipitation for Fresno

**Cumulative Rainfall - Fresno, CA
2013-2014 vs. Average**



Landscape Irrigation:

What Determines Water Use in a Landscape?

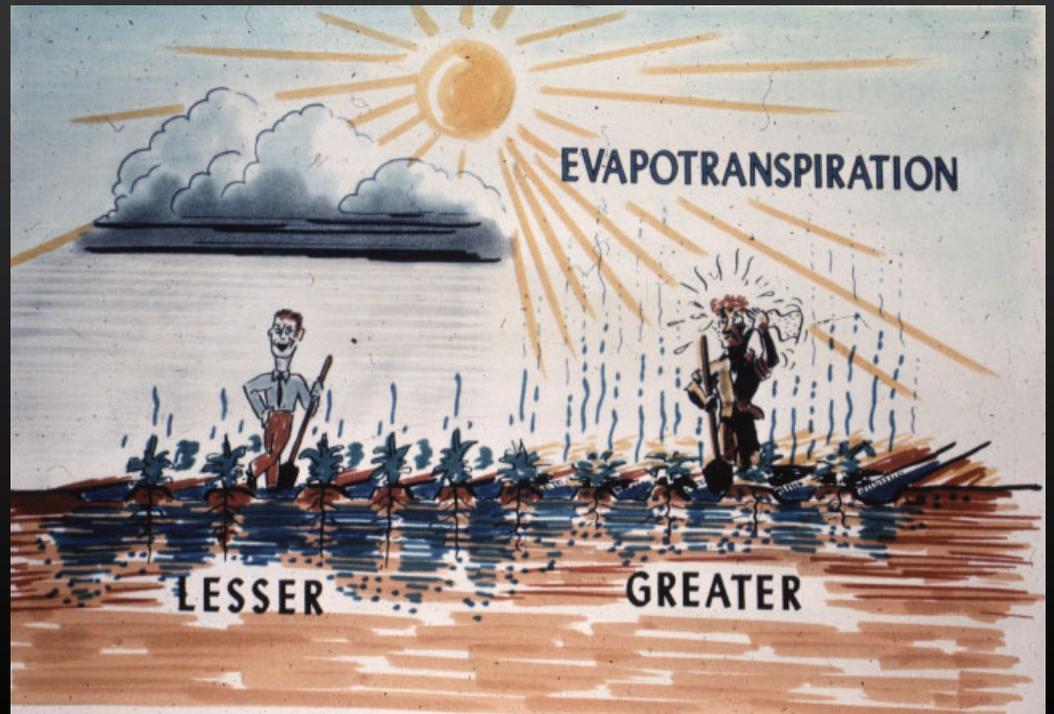


Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment

- Climate - hot, cool, dry, humid, cloudy, windy

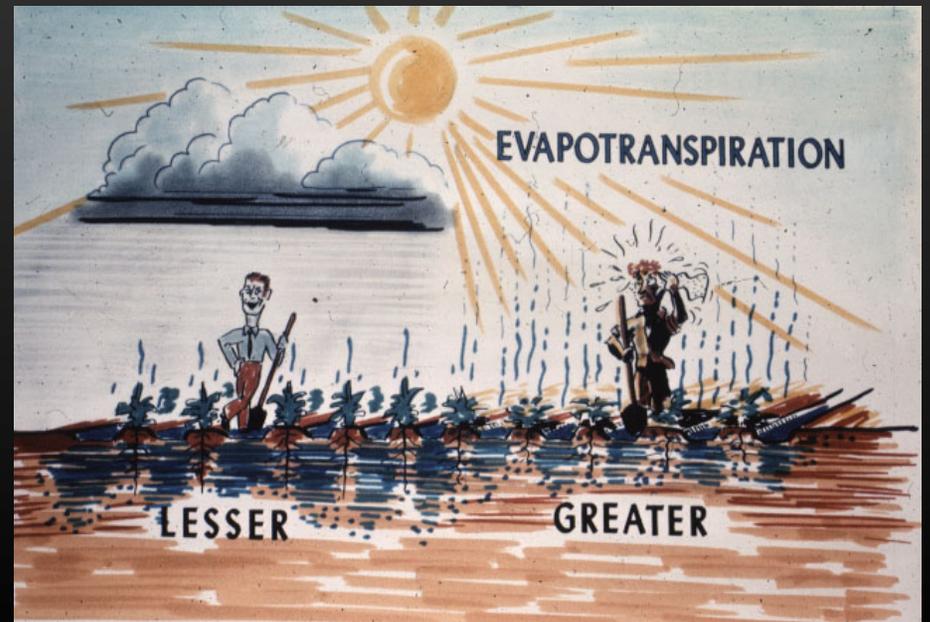


Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment

- 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?

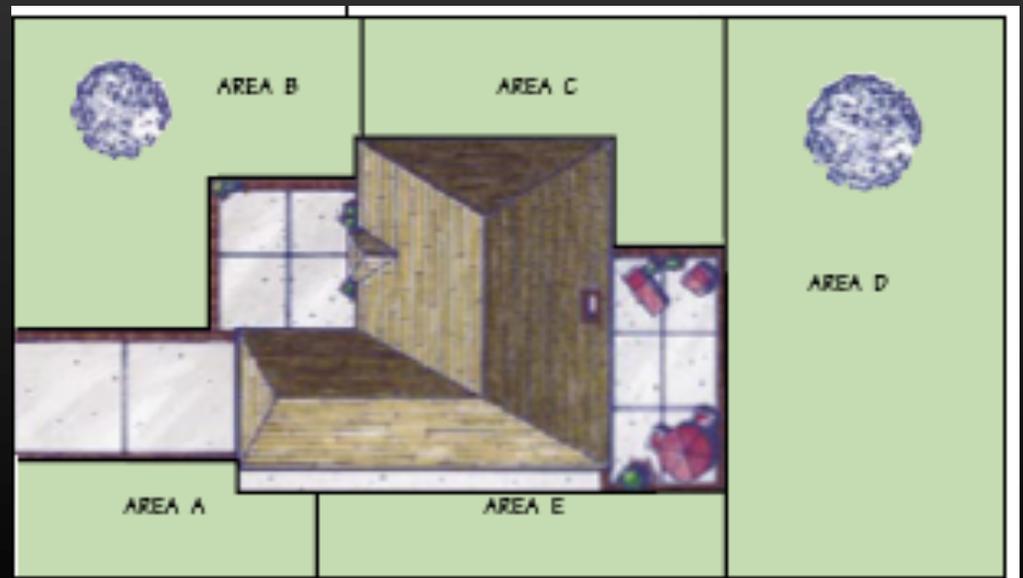
1. Growing environment
2. Types of plants
 - Trees



Landscape Irrigation:

What Determines Water Use in a Landscape?

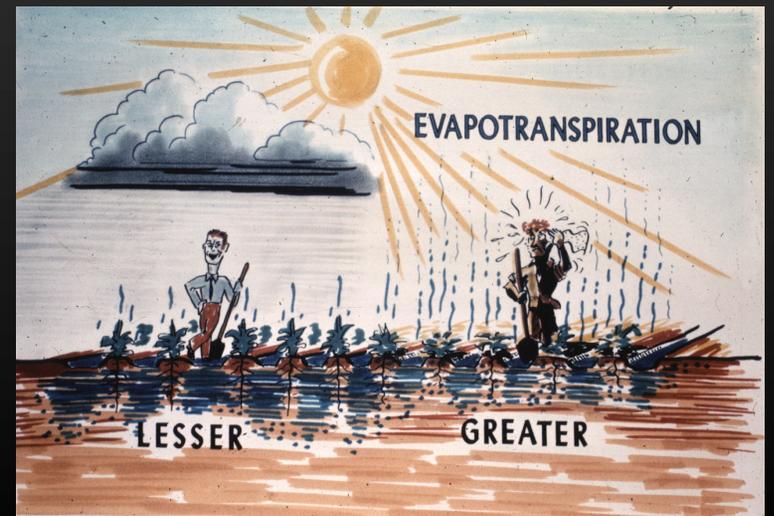
1. Growing environment
2. Types of plants
 - Trees - on a canopy area basis, they *can* use significantly more than turfgrass.



Plant Water Use:

- Measure evapotranspiration (ET).

Evaporation from the soil
+
Transpiration from the plant



Where do you get ET estimates?



Historical ET estimates:

Walnut historical ET - inches during period

Date	Red Bluff	Chico	Stockton	Modesto	Parlier	Visalia
Mar 16-31	—	0.23	0.23	0.23	0.25	0.25
Apr 1-15	—	1.27	1.25	1.11	1.35	1.27
Apr 16-30	1.35	1.73	1.87	1.84	1.94	2.04
May 1-15	1.50	2.49	2.45	2.25	2.61	2.49
May 16-31	2.40	3.03	2.97	3.16	3.30	3.16
June 1-15	2.55	3.49	3.39	3.63	3.63	3.63
June 16-30	3.00	3.90	3.85	3.90	4.05	4.05
July 1-15	3.45	4.62	4.50	4.45	4.62	4.62
July 16-31	4.32	4.56	4.39	4.74	4.56	4.92
Aug 1-15	4.20	4.10	4.05	4.10	4.10	4.28
Aug 16-31	4.48	3.83	3.65	3.65	4.01	4.01
Sept 1-15	3.60	2.62	2.97	3.08	3.08	3.40
Sept 16-30	2.85	2.33	2.18	2.18	2.18	2.47
Oct 1-15	2.25	1.72	1.63	1.72	1.72	1.85
Oct 16-31	0.96	0.57	0.71	0.73	0.73	0.82
Nov 1-15	0.30	0.25	0.27	0.29	0.29	0.34

Real-Time Weather Monitoring:

- Measure evapotranspiration (ET).
- CIMIS weather stations predict the ET of pasture grass (Reference ET = ET_0).



CALIFORNIA

IRRIGATION

MANAGEMENT

INFORMATION

SYSTEM

Accessing CIMIS data:

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



The screenshot shows the homepage of the California Irrigation Management Information System (CIMIS). At the top, there is a header with the California state logo and the text "CALIFORNIA THE GOLDEN STATE". To the right, there are links for "CALIFORNIA HOMEPAGE" and "GOVERNOR'S HOMEPAGE". The main heading "CIMIS" is prominently displayed in large blue letters, with the full name "CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM" and "DEPARTMENT OF WATER RESOURCES OFFICE OF WATER USE EFFICIENCY" below it. A navigation menu includes "WELCOME", "INFO CENTER", "DATA", "RESOURCE CENTER", and "MY CIMIS". The left sidebar contains a "General" section with links for Events, System News, FAQs, and CIMIS Staff, followed by "Upcoming Events" and "Current System News" with a list of station status updates. The main content area features a "Welcome" message and a "CIMIS Overview" section. On the right, there is a "CIMIS System Status" box with a "REGISTER" button for instant weather data access and a "Irrigate like a Pro" graphic.

CALIFORNIA THE GOLDEN STATE

CALIFORNIA HOMEPAGE GOVERNOR'S HOMEPAGE

CIMIS

CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM
DEPARTMENT OF WATER RESOURCES
OFFICE OF WATER USE EFFICIENCY

WELCOME INFO CENTER DATA RESOURCE CENTER MY CIMIS

General

- Events
- System News
- FAQs
- CIMIS Staff

Upcoming Events

- Non-ideal site study update
- New CIMIS Web Site
- My CIMIS

Current System News

- Station #176 (La Quinta) Disconnected
- Station #27 (Zamora) disconnected
- #177 Watsonville West
- New Station #198

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. [\(more...\)](#)

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. [\(more...\)](#)

Irrigate like a Pro

CIMIS System Status:
The normal Maintenance window is:
Tuesday 04:00 - 06:00 PM

REGISTER
instant weather data access

Weather monitoring:

- Measure evapotranspiration (ET).
- Weather stations predict the ET of pasture grass (Reference ET = ET_0).
- Convert the reference ET (ET_0) to your crop's ET (ET_{crop}) using a crop coefficient (k_c).

Determining Crop ET:

Crop ET = Reference ET x Crop Coefficient

$$ET_{\text{crop}} = ET_0 \times k_c$$

Crop Coefficient for Walnuts (k_c) in late June = 1.0

Irrigation scheduling example:

Warm season
Turf = 0.6

Cool season
Turf = 0.8

Date	Almonds	Walnuts	Pistachios	Stone fruit	Prunes	Olives	Citrus
Jan 1–15	—	—	—	—	—	0.8	0.65
Jan 16–31	—	—	—	—	—	0.8	0.65
Feb 1–15	—	—	—	—	—	0.8	0.65
Feb 16–28	—	—	—	—	—	0.8	0.65
Mar 1–15	—	—	—	0.55	—	0.8	0.65
Mar 16–31	0.54	0.12	—	0.62	—	0.8	0.65
Apr 1–15	0.60	0.53	0.07	0.67	0.62	0.8	0.65
Apr 16–30	0.66	0.68	0.43	0.73	0.84	0.8	0.65
May 1–15	0.73	0.79	0.68	0.78	0.96	0.8	0.65
May 16–31	0.79	0.86	0.93	0.85	0.96	0.8	0.65
June 1–15	0.84	0.93	1.09	0.87	0.96	0.8	0.65
June 16–30	0.86	1.00	1.17	0.87	0.96	0.8	0.65
July 1–15	0.93	1.14	1.19	0.87	0.96	0.8	0.65
July 16–31	0.94	1.14	1.19	0.87	0.96	0.8	0.65
Aug 1–15	0.94	1.14	1.19	0.87	0.95	0.8	0.65
Aug 16–31	0.94	1.14	1.12	0.87	0.92	0.8	0.65
Sept 1–15	0.94	1.08	0.99	0.87	0.84	0.8	0.65
Sept 16–30	0.91	0.97	0.87	0.82	0.78	0.8	0.65

Landscape Irrigation:

What Determines Water Use in a Landscape?

1. Growing environment

2. Types of plants

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- Turfgrass - cool season, warm season



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2. Types of plants

- Trees - on a canopy area basis, they *can* use significantly more than turfgrass. Nice shade & can be food.
- 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 and surrounding environment.

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2. Types of plants
3. Irrigation system

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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?



Landscape Irrigation:

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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?
- Want to apply water only to those areas where plants can take it up.

Efficiency

Look for “Targets of Opportunity” to Save Water

1. Sprinklers are often good candidates - a lot of water can be lost to runoff down the gutter.

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2. Turf & deciduous trees are often big water users.
 - Turf is large user and is sprinkler irrigated.

Look for “Targets of Opportunity” to Save Water

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2. Turf & deciduous trees are often big water users.
 - Turf is large user and is sprinkler irrigated.
 - Water use reduced by being more efficient or reducing turf area.



Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
 - Back off on irrigation until see stressed areas in lawn. Irrigate those areas periodically by hand.



Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- **Reduce the water lost to runoff.**
 - Time when runoff starts = station run time.
 - If need more irrigation time, cycle on and off
 - Wait at least 1 hour between irrigations.

Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- **Reduce the water lost to runoff.**
 - Time when runoff starts = station run time.
 - If need more irrigation time, cycle on and off
 - Wait at least 1 hour between irrigations.
 - Adjust the sprinklers so don't water sidewalks & driveways.



Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- Reduce the water lost to runoff.
- Irrigate in the early morning.

Reduce evaporation



Turfgrass Irrigation - Saving water:

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Reduce evaporation
Visually check for
problems



Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- Reduce the water lost to runoff.
- Irrigate in the early morning.
- Adjust your controller for changing water needs.



Smart Controllers

- Biggest thing happening in landscape irrigation now.



Smart Controllers

- An irrigation controller which *automatically* adjusts the irrigation run times based on *environmental conditions*.

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What environmental conditions?

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- An irrigation controller which *automatically* adjusts the irrigation run times based on *environmental conditions*.

What environmental conditions?

- Soil moisture conditions
- Weather conditions

Smart Controller with Soil Moisture Feedback?

Types of **soil moisture feedback**:

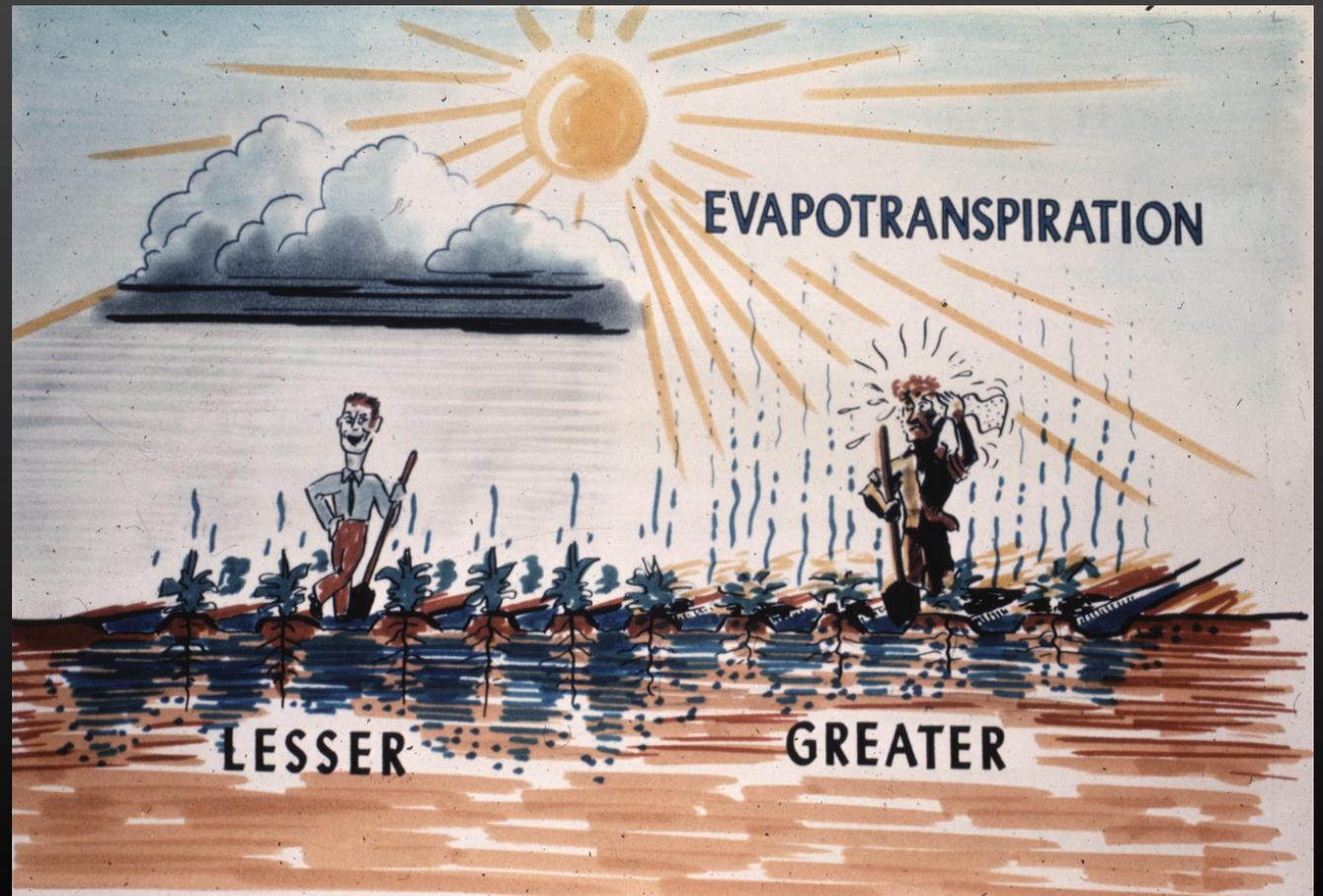
1. You set the irrigation schedule & soil moisture feedback cancels the programmed irrigation if “irrigation is not needed”.
2. Soil moisture feedback controls the irrigations. Turns it on when needed.



Smart Controller with Soil Moisture Feedback?

Weakness: Where do you place the soil moisture sensor?
Is it representative of the whole landscape?

ET = Evapotranspiration = Plant Water Use



Smart Controller with Weather Conditions Feedback?

- 1. Historical ET info. in controller so that irrigation runtimes change as ET has changed historically. “Average” year.**
- 2. Historical ET with adjustment from an on-site weather station.**
- 3. Controller uses on-site weather station to determine irrigation run times.**
- 4. Controller hooked into a wireless system which “beams” info. to controller.**
 - Some hooked in so you can input / access data via the internet.**
 - Initial costs + annual subscription**

Smart Controller with Weather Conditions Feedback?

Weakness: Is the weather info. the decisions are based on representative of what your landscape is experiencing?

- Weather station citing.
- Measurement instrument accuracy / reliability.
- **Conversion of weather info. to landscape plant ET.**

Smart Controller: Use them?

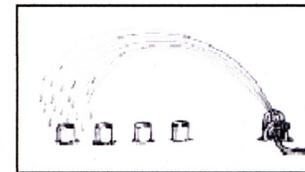
- **For turf, they should be beneficial.**
- **For mixed landscapes, difficult to use.**

Turfgrass Irrigation Management:

- How long to run the sprinklers?
 - Depends on:
 1. Time of year.
 2. Sprinkler application rate.

How Long Should I Run the Sprinklers?

*Adapted from UC Pub #7497, 8044, and 21503
Michelle Le Strange, UC Cooperative Extension, Tulare & Kings Counties*



Turf Tip

Spring is the time to prepare the lawn for summer heat because mild temperatures favor root growth and roots supply water to leaf blades. Watering thoroughly and infrequently allows roots to develop deeper than six inches in the soil profile.

Deep roots help lawns stay vigorous in hot weather.

Step 2. Determine the output of the sprinklers.

To determine sprinkler output, conduct “can tests” by setting small, empty, straight-sided, equal-sized containers such as tuna or cat food cans on top of the lawn every 10 to 15 feet (or closer depending on the size of the lawn) between sprinkler heads operated by the same valve. Run the system for 20 minutes and then use

Turfgrass Irrigation Management:

- How long to run the sprinklers?

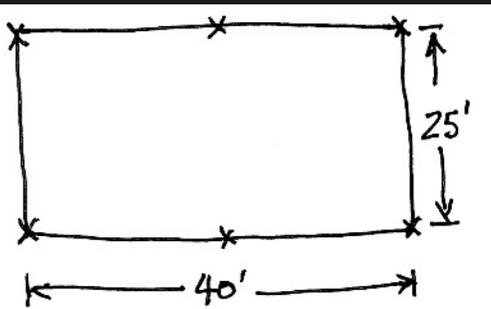
Minutes to Water: San Joaquin Valley & Foothills								
Warm-season turfgrasses					Cool-season turfgrasses			
<i>Minutes per week to irrigate if your hourly sprinkler output is:</i>					<i>Minutes per week to irrigate if your hourly sprinkler output is:</i>			
0.5 in	1.0 in	1.5 in	2.0 in		0.5 in	1.0 in	1.5 in	2.0 in
19	09	06	05	JAN	25	13	08	06
38	19	13	09	FEB	50	25	17	13
69	35	23	17	MAR	92	46	31	23
101	50	34	25	APR	134	67	45	34
132	66	44	33	MAY	176	88	59	44
164	82	55	41	JUN	218	109	73	55
170	85	57	43	JUL	227	113	76	57
145	72	48	36	AUG	193	97	64	48
113	57	38	28	SEPT	151	76	50	38
69	35	23	17	OCT	92	46	31	23
32	16	11	08	NOV	42	21	14	11
13	06	04	03	DEC	17	08	06	04

Turfgrass Irrigation Management:

- Sprinkler application rate:
 - Set out some “catch cans” to determine your application rate.

5-foot spacing

15 min run time



Turfgrass Irrigation Management:

- Sprinkler application rate:
 - Set out some “catch cans” to determine your application rate.

Measure the amount
of water collected



Turfgrass Irrigation Management:

Catch can test

mm collected in
15 minutes

15 min x 4 = 1 hr

24.5 mm = 1 inch

X SPRINKLER	• 1.8	• 3.0	• 1.7	X SPRINKLER
• 2.8	• 2.8	• 3.9	• 1.5	• 1.8
• 4.1	• 5.5	• 3.5	• 1.7	• 1.5
• 4.6	• 4.3	• 3.5	• 1.7	• 2.0
• 5.9	• 8.1	• 4.4	• 2.2	• 2.2
X SPRINKLER	• 1.5	• 3.1	• 7.2	X SPRINKLER

Turfgrass Irrigation Management:

Catch can test

Inches per hour

Average = 0.52 in/hr

X SPRINKLER	0.29	0.47	0.26	X SPRINKLER
0.44	0.44	0.61	0.23	0.29
0.64	0.87	0.55	0.26	0.23
0.73	0.67	0.55	0.26	0.32
0.93	1.28	0.70	0.35	0.35
X SPRINKLER	0.23	0.49	1.14	X SPRINKLER

Turfgrass Irrigation Management:

- Sprinkler application = 0.52 in/hr

Region 5: San Joaquin Valley

Warm-Season Turfgrasses

Minutes per week to irrigate if your hourly sprinkler output is:

	0.5 in	1.0 in	1.5 in	2.0 in
JAN	19	09	06	05
FEB	38	19	13	09
MAR	69	35	23	17
APR	101	50	34	25
MAY	132	66	44	33
JUN	164	82	55	41
JUL	170	85	57	43
AUG	145	72	48	36
SEP	113	57	38	28
OCT	69	35	23	17
NOV	32	16	11	08
DEC	13	06	04	03

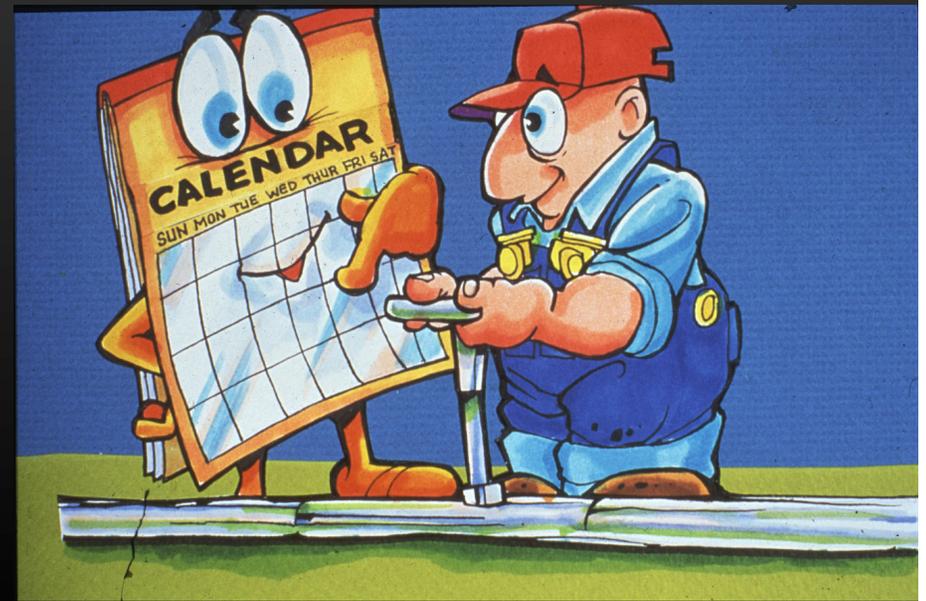
Cool-Season Turfgrasses

Minutes per week to irrigate if your hourly sprinkler output is:

	0.5 in	1.0 in	1.5 in	2.0 in
JAN	25	13	08	06
FEB	50	25	17	13
MAR	92	46	31	23
APR	134	67	45	34
MAY	176	88	59	44
JUN	218	109	73	55
JUL	227	113	76	57
AUG	193	97	64	48
SEP	151	76	50	38
OCT	92	46	31	23
NOV	42	21	14	11
DEC	17	08	06	04

Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- Reduce the water lost to runoff.
- Irrigate in the early morning.
- Adjust your controller for changing water needs.
- Try to avoid daily irrigations.
 - Odd/even watering requirements.

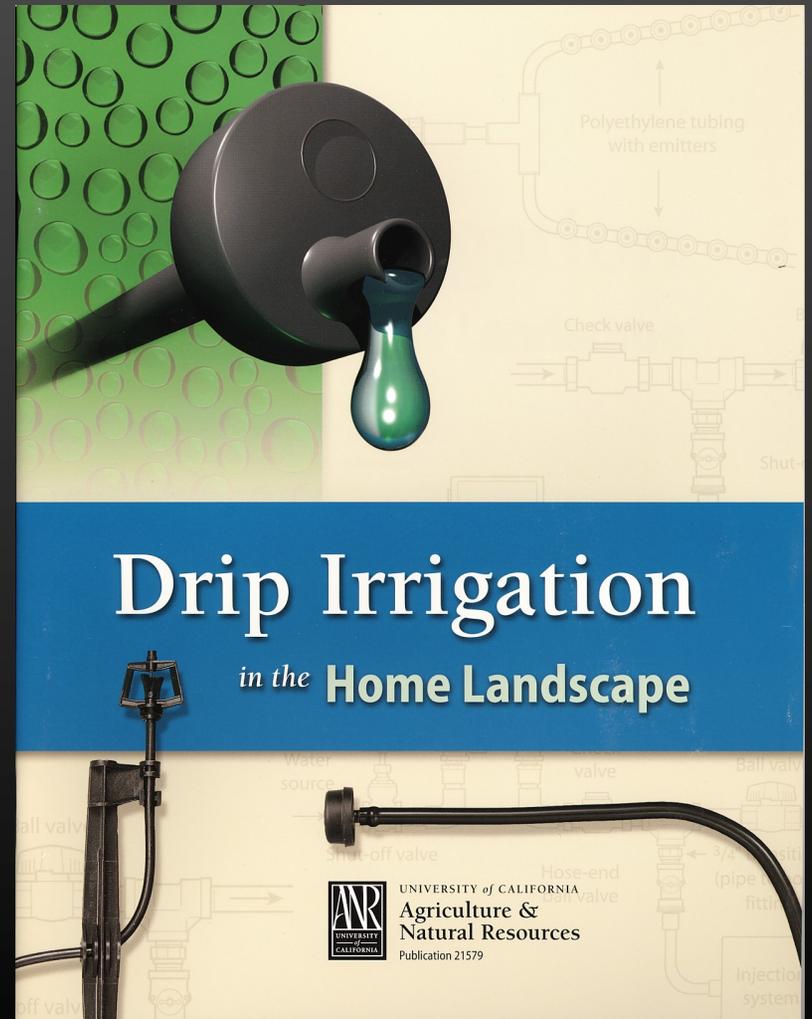


Turfgrass Irrigation - Saving water:

- Don't irrigate so entire lawn is green & lush.
- Reduce the water lost to runoff.
- Irrigate in the early morning.
- Adjust your controller for changing water needs.
- Try to avoid daily irrigations.
- Make sure sprinklers pop up above the grass.

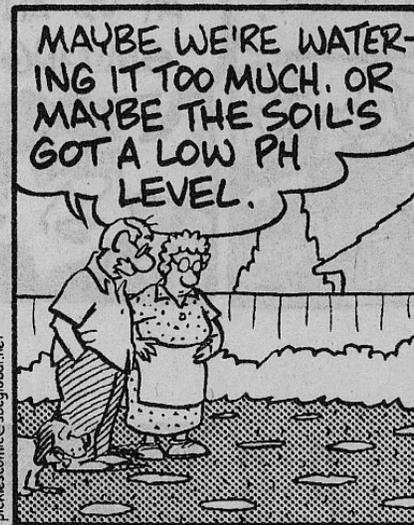
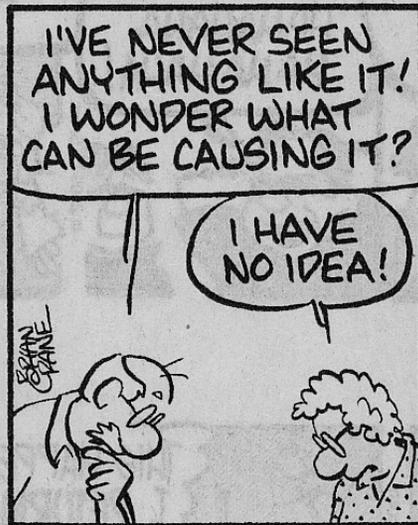


Drip Irrigation:



Questions?

PICKLES



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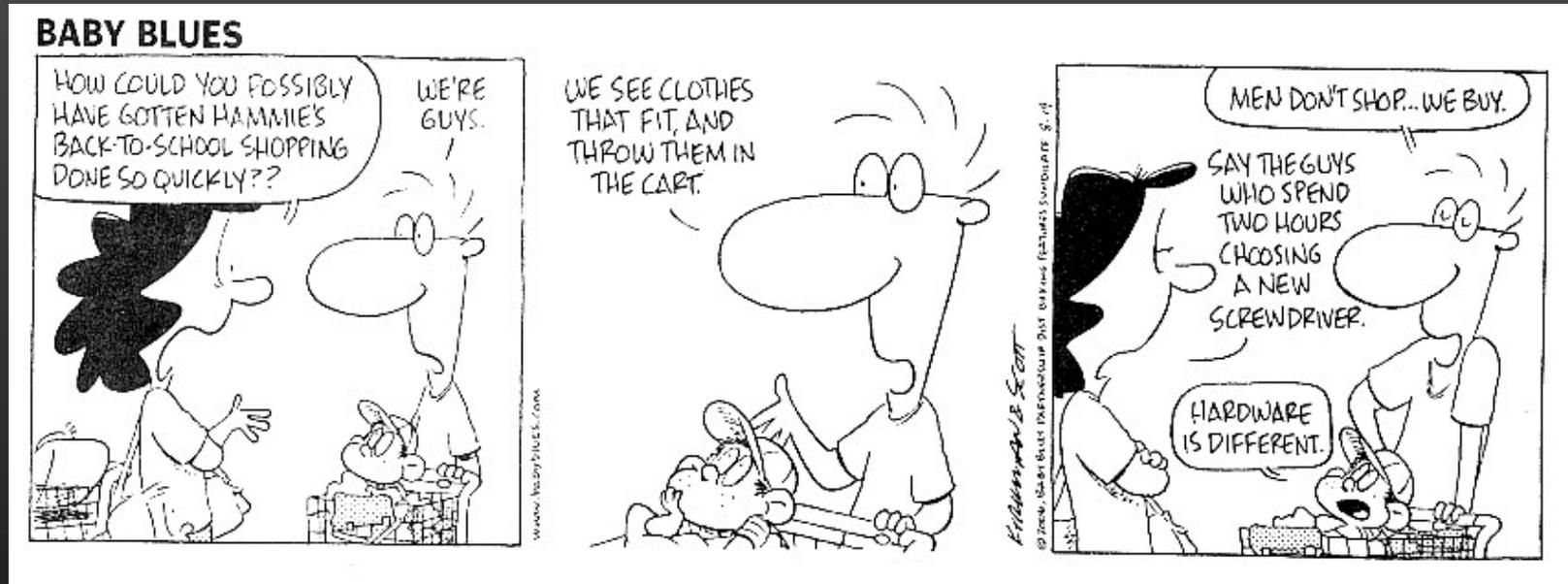
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www.anrcatalog.ucdavis.edu

Lawn Watering Guide for CA: Pub. 8044

Drip Irrig. In the Home Landscape: Pub. 21579

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