



# CIMIS

Department of Water Resources  
State of California

Como se usa la informacion de evapotranspiracion (Eto) para producir un calendario de riego?

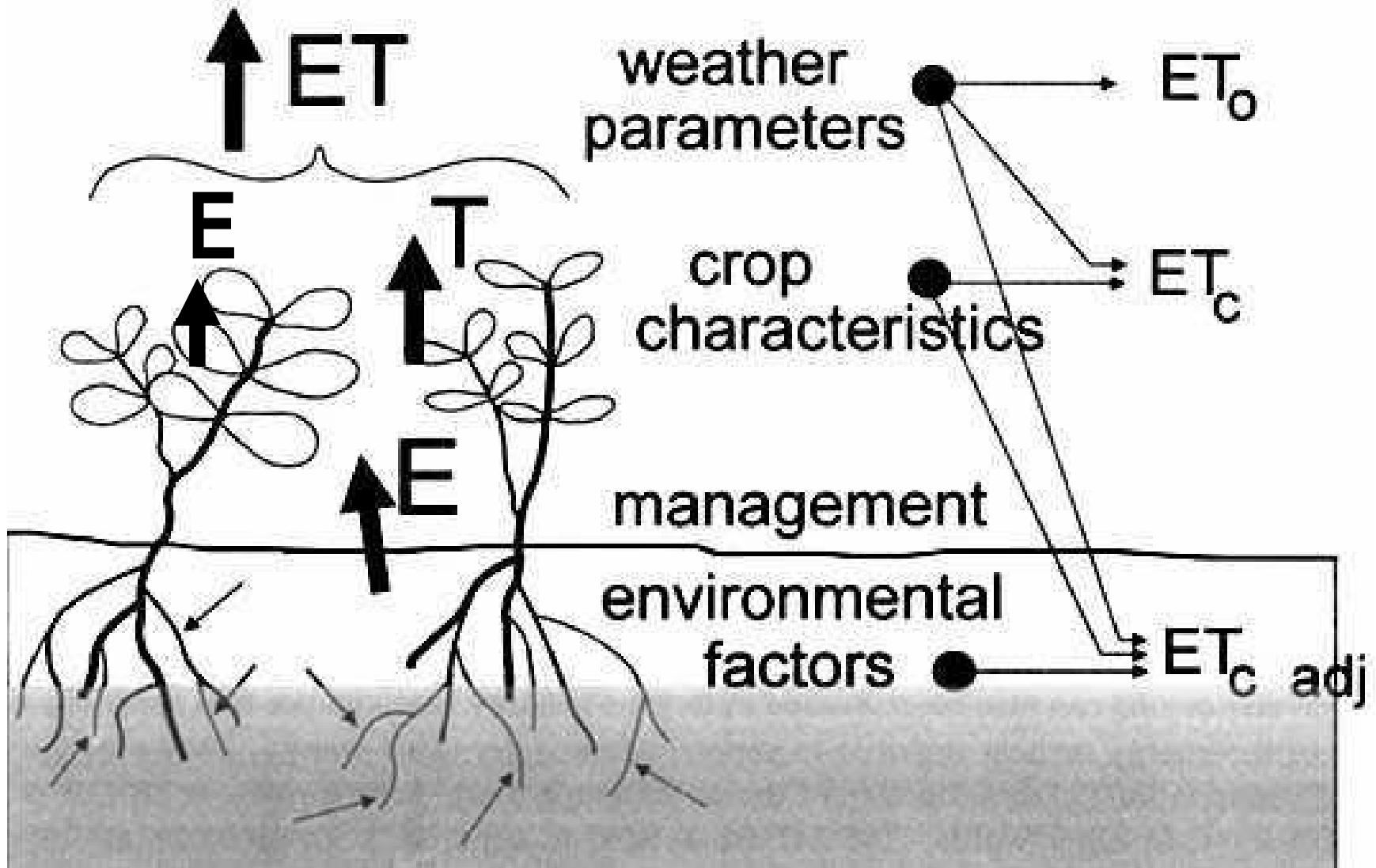
Un simple medio es utilizar un presupuesto de agua, que es similar a mantener una cuenta de ahorros.





El agua que entra al deposito del suelo, como lluvia o riego, es analogo como hacer un deposito.

Water that leaves the system is analogous to making a withdrawal.



El Coeficiente del Cultivo  
(Kc) es multiplicado por el  
ETo de la estación  
climotologica para ajustar el  
riego necesario del cultivo en  
diferentes temporadas del  
año.

“ET del cultivo” o ETc.

Por Ejemplo:

$K_c = 0.55$  (Uvas de vino - desarrollo)

y  $E_{To} = 0.20$  (Rango en Primavera) entonces:

$$K_c \times E_{To} = E_{Tc}$$

o

$$0.55 \times 0.20 = 0.11$$

Esto quiere decir que necesitamos agregar 0.11 pulgadas de agua y no .20 pulgadas, para este cultivo.

Por Ejemplo:

$K_c = 0.20$  (Uvas de vino - inactivo)

y  $ET_o = 0.06$  (Rango en Invierno) entonces:

$$K_c \times ET_o = ET_c$$

o

$$0.20 \times 0.06 = 0.012$$

Esto quiere decir que necesitamos agregar 0.012 pulgadas de agua y no .06 pulgadas, para este cultivo.

## Ejemplo - Lechuga

$$K_c = 0.60 \text{ (Lechuga - desarrollo)}$$

y  $ET_o = 0.11$  (Rango en Primavera) entonces:

$$K_c \times ET_o = ET_c$$

o

$$0.60 \times 0.11 = 0.066$$

Esto quiere decir que necesitamos agregar 0.066 pulgadas de agua y no .11 pulgadas para este cultivo.

## Ejemplo - Lechuga

$$K_c = 1.00 \text{ (Lechuga - madura)}$$

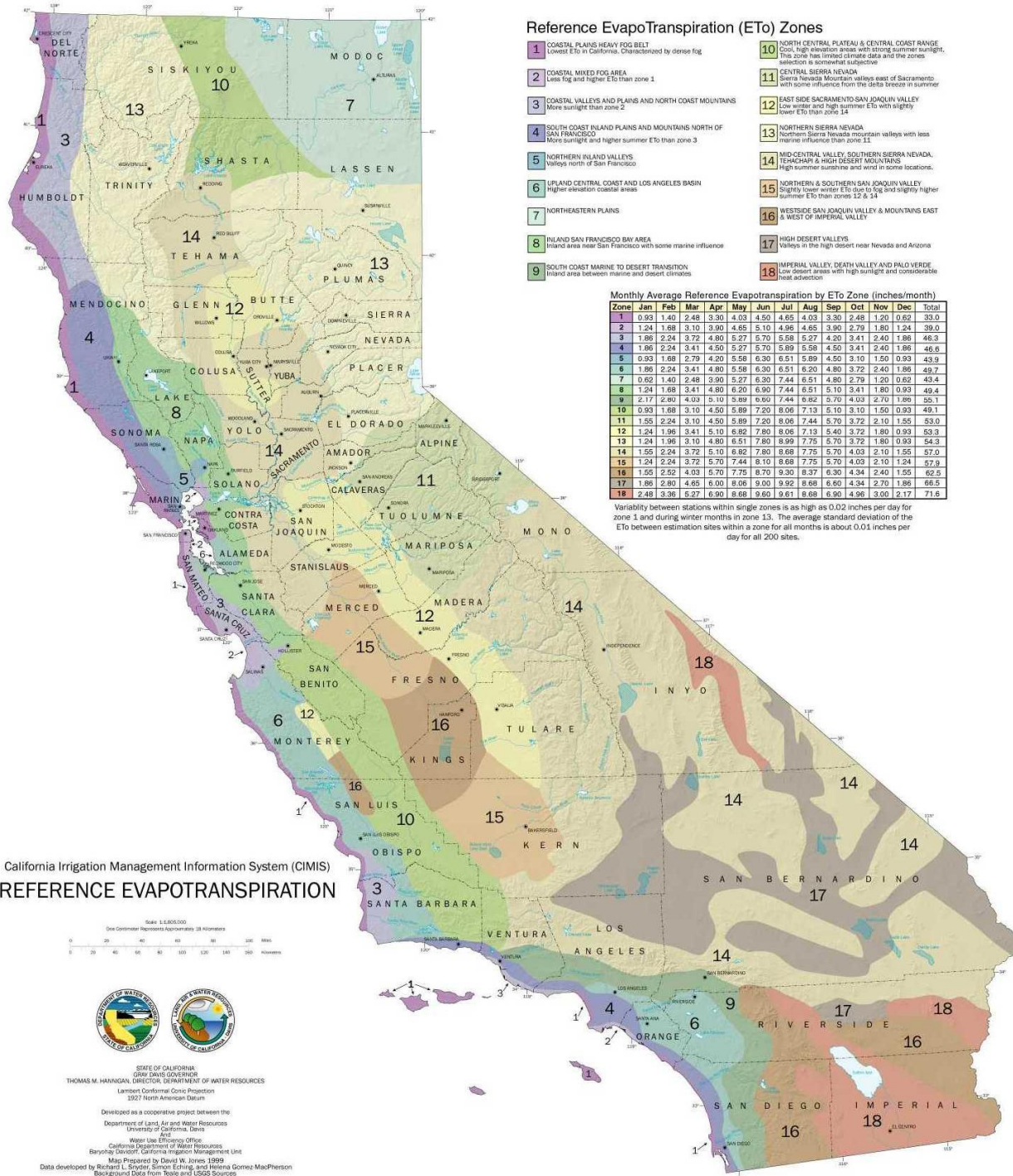
y  $E_{To} = 0.11$  (Rango en Primavera) entonces:

$$K_c \times E_{To} = E_{Tc}$$

o

$$1.0 \times 0.11 = 0.11$$

Esto quiere decir que necesitamos agregar 0.11 pulgadas de agua para este cultivo.



### Reference EvapoTranspiration (ETo) Zones

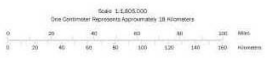
- 1 COASTAL PLAINS HEAVY FOG BELT  
Lowest ETo in California. Characterized by dense fog
- 2 COASTAL MIXED FOG AREA  
Less fog and higher ETo than zone 1
- 3 COASTAL VALLEYS AND PLAINS AND NORTH COAST MOUNTAINS  
More sunlight than zone 2
- 4 SOUTH COAST INLAND PLAINS AND MOUNTAINS NORTH OF SAN FRANCISCO  
More sunlight and higher summer ETo than zone 3
- 5 NORTHERN INLAND VALLEYS  
Valleys north of San Francisco
- 6 UPLAND CENTRAL COAST AND LOS ANGELES BASIN  
Higher elevation coastal areas
- 7 NORTHEASTERN PLAINS
- 8 INLAND SAN FRANCISCO BAY AREA  
Inland area near San Francisco with some marine influence
- 9 SOUTH COAST MARINE TO DESERT TRANSITION  
Inland area between marine and desert climates
- 10 NORTH CENTRAL PLATEAU & CENTRAL COAST RANGE  
Cool, high elevation areas with strong summer sunlight. This zone has limited climate data and the zones selection is somewhat subjective
- 11 CENTRAL SIERRA NEVADA  
Sierra Nevada Mountain valleys east of Sacramento with some influence from the delta breezes in summer
- 12 EAST SIDE SACRAMENTO-SAN JOAQUIN VALLEY  
Low winter and high summer ETo with slightly lower ETo than zone 14
- 13 NORTHERN SIERRA NEVADA  
Northern Sierra Nevada mountain valleys with less marine influence than zone 11
- 14 MID-CENTRAL VALLEY SOUTHERN SIERRA NEVADA, TENACHAPA & HIGH DESERT MOUNTAINS  
High summer sunshine and wind in some locations.
- 15 NORTHERN & SOUTHERN SAN JOAQUIN VALLEY  
Slightly lower winter ETo due to fog and slightly higher summer ETo than zones 12 & 14
- 16 WESTSIDE SAN JOAQUIN VALLEY & MOUNTAINS EAST & WEST OF IMPERIAL VALLEY
- 17 HIGH DESERT VALLEYS  
Valleys in the high desert near Nevada and Arizona
- 18 IMPERIAL VALLEY, DEATH VALLEY AND PALO VERDE  
Low desert areas with high sunlight and considerable heat advection

Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	0.93	1.40	2.48	5.30	4.03	4.50	4.85	4.03	3.30	2.48	1.20	0.92	33.91
2	1.24	1.68	3.10	3.90	4.65	5.10	4.96	4.65	3.90	2.79	1.80	1.24	39.00
3	1.86	2.24	3.72	4.80	5.27	5.70	5.58	5.27	4.20	3.41	2.40	1.86	46.30
4	1.86	2.24	3.41	4.50	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86	46.60
5	0.93	1.68	2.79	4.20	5.58	6.30	6.51	5.89	4.50	3.10	1.50	0.93	43.90
6	1.96	2.24	3.41	4.80	5.58	6.30	6.51	6.20	4.80	3.72	2.40	1.86	49.70
7	0.62	1.40	2.48	3.90	5.27	6.30	7.44	6.51	4.80	2.79	1.20	0.62	43.40
8	1.24	1.68	3.41	4.80	6.20	6.90	7.44	6.51	5.10	3.41	1.80	0.93	49.40
9	2.17	2.60	4.03	5.10	5.89	6.60	7.44	6.82	5.70	4.03	2.70	1.86	55.10
10	0.93	1.68	3.10	4.50	5.89	7.20	8.06	7.13	5.10	3.10	1.50	0.93	49.10
11	1.55	2.24	3.10	4.50	5.89	7.20	8.06	7.44	5.70	3.72	2.10	1.55	53.00
12	1.24	1.96	3.41	5.10	6.82	7.80	8.06	7.13	5.40	3.72	1.80	0.93	53.30
13	1.24	1.96	3.10	4.80	6.51	7.80	8.99	7.75	5.70	3.72	1.80	0.93	54.30
14	1.55	2.24	3.72	5.10	6.82	7.80	8.68	7.75	5.70	4.03	2.10	1.55	57.00
15	1.24	2.24	3.72	5.70	7.44	8.10	8.68	7.75	5.70	4.03	2.10	1.24	67.90
16	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.50
17	1.86	2.80	4.65	6.00	8.06	9.00	9.92	8.68	6.60	4.34	2.70	1.86	66.50
18	2.48	3.36	5.27	6.90	8.68	9.60	9.61	8.68	6.90	4.96	3.00	2.17	71.60

Variability between stations within single zones is as high as 0.02 inches per day for zone 1 and during winter months in zone 13. The average standard deviation of the ETo between estimation sites within a zone for all months is about 0.01 inches per day for all 200 sites.

### California Irrigation Management Information System (CIMIS) REFERENCE EVAPOTRANSPIRATION



STATE OF CALIFORNIA  
GARY DAVID GOVERNER  
THOMAS M. HANNIGAN, DIRECTOR, DEPARTMENT OF WATER RESOURCES  
Lambert Conformal Conic Projection  
1983 North American Datum

Developed as a cooperative project between the  
Department of Land, Air and Water Resources  
University of California, Davis  
Water Use Efficiency Office  
California Department of Water Resources  
Baywatch Division, California Irrigation Management Unit

Map Prepared by David W. Jones 1999  
Data developed by Richard L. Snyder, Simon Ething, and Helena Gomez MacPherson  
Background Data from Teale and USGS Sources



Anotando esta clases de datos,  
es posible saver  
aproximadamente cuanta agua  
se encuentra en el suelo a  
cualquier momento.



Date	Rainfall	Irrigation	ETc	Depletion	H2O Available
1-Jul	0.00	0.00	0.00	0.00	2.50
2-Jul	0.00	0.00	0.30	0.30	2.20
3-Jul	0.00	0.00	0.19	0.49	2.01
4-Jul	0.00	0.00	0.22	0.71	1.79
5-Jul	0.00	0.00	0.28	0.99	1.51
6-Jul	0.00	0.00	0.25	1.24	1.26
7-Jul	0.00	0.00	0.26	1.50	1.00
8-Jul	0.00	0.00	0.28	1.78	0.72
9-Jul	0.00	0.00	0.32	2.10	0.40
10-Jul	0.00	0.00	0.36	2.46	0.04
11-Jul	0.00	2.50	0.40	0.36	2.14
12-Jul	0.00	0.00	0.22	0.58	1.92
13-Jul	0.42	0.00	0.11	0.27	2.23
14-Jul	0.25	0.00	0.15	0.17	2.33
15-Jul	0.00	0.00	0.25	0.42	2.08

## **Beneficios del Programa CIMIS son:**

- \*Aumentar cantidad de producto.**
- \*Mejorar la calidad del cultivo.**
- \*Reducir drenaje y uso de agua.**
- \*Conservar energía.**
- \*Reducir mano de obra, abono y agro-químicos.**

## Beneficios a los productores usado CIMIST†

Cultivo	Dolares/Acre
Almendra	165
Manzana	148
Aguacate	308
Coliflor	352
Apio	717

† Source University of California, Berkeley