# Conceptos Esenciales para la Irrigacion y Conservacion del Agua


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UCDAVIS WATER MANAGEMENT LAB

WATER TALK

# Contenido

- Precipitacion
- Evapo-transpiracion
- Necesidades de irrigacion

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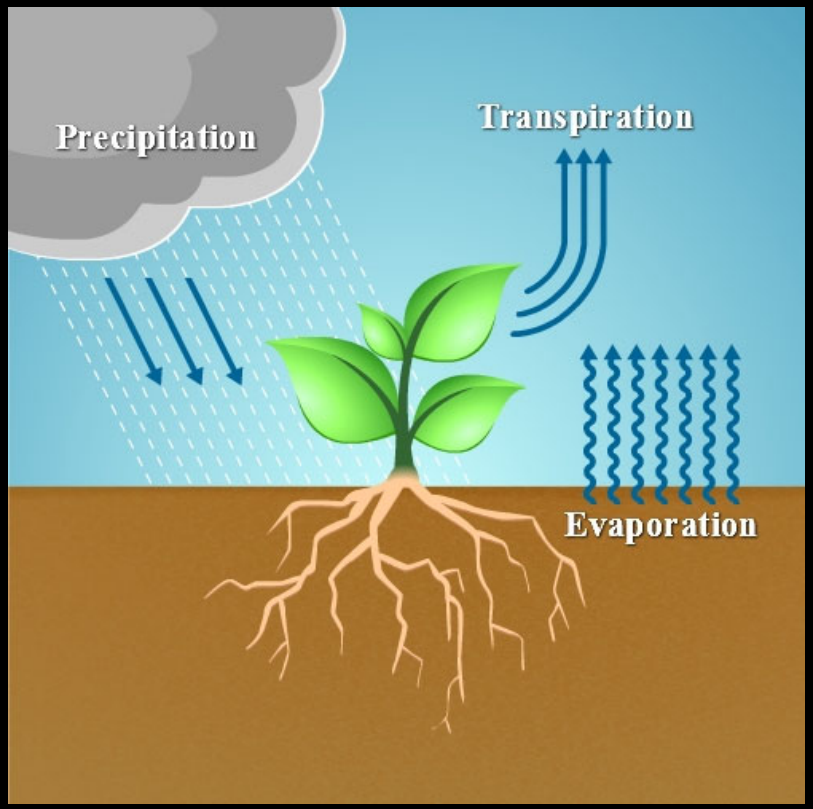
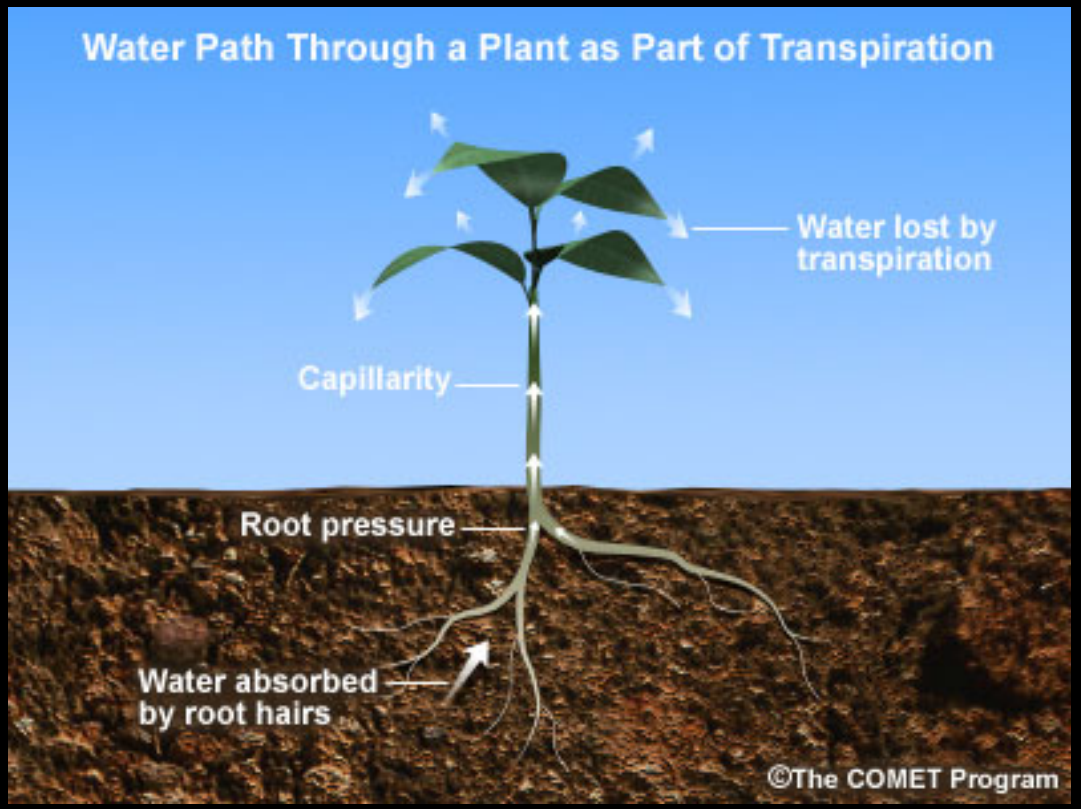
# Evapotranspiracion

# Evapotranspiracion

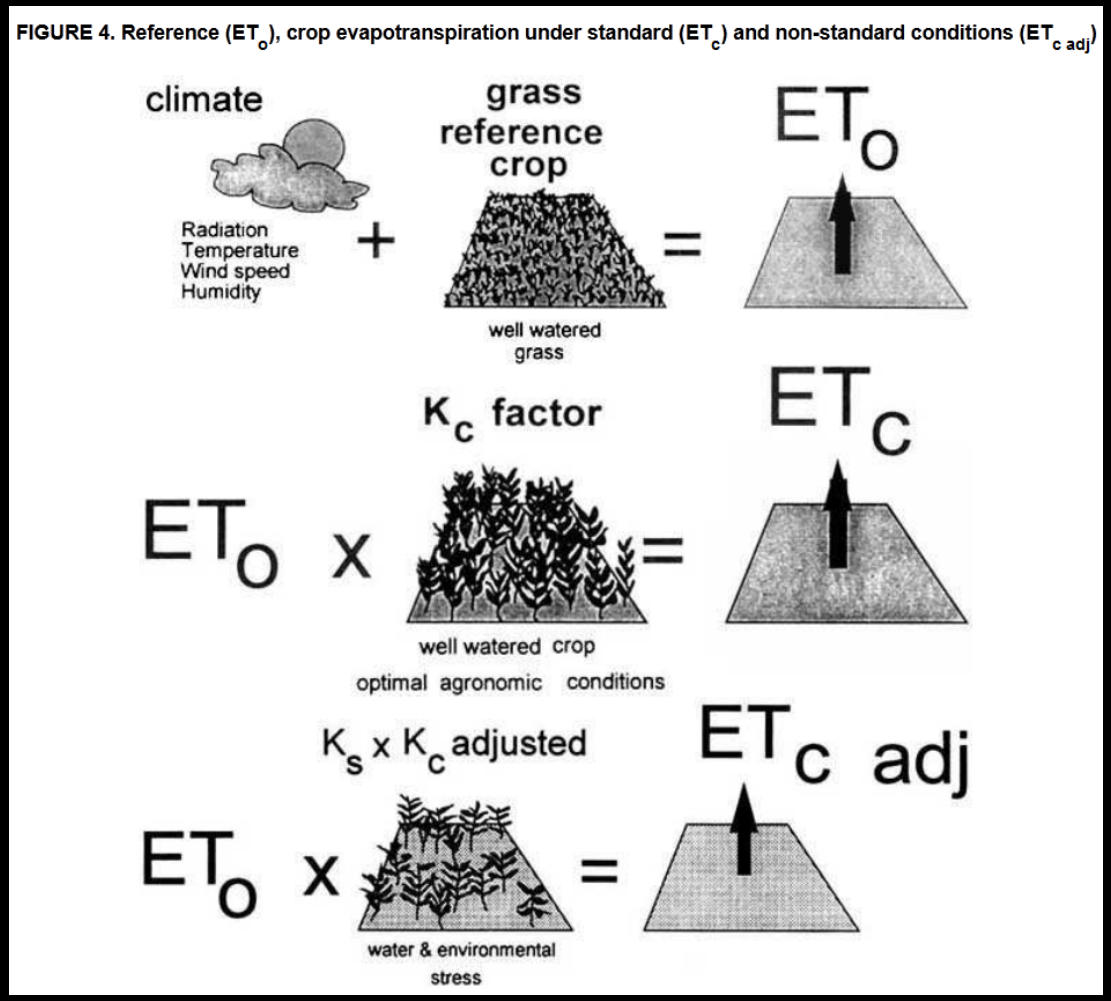
## Evaporacion




## Transpiracion



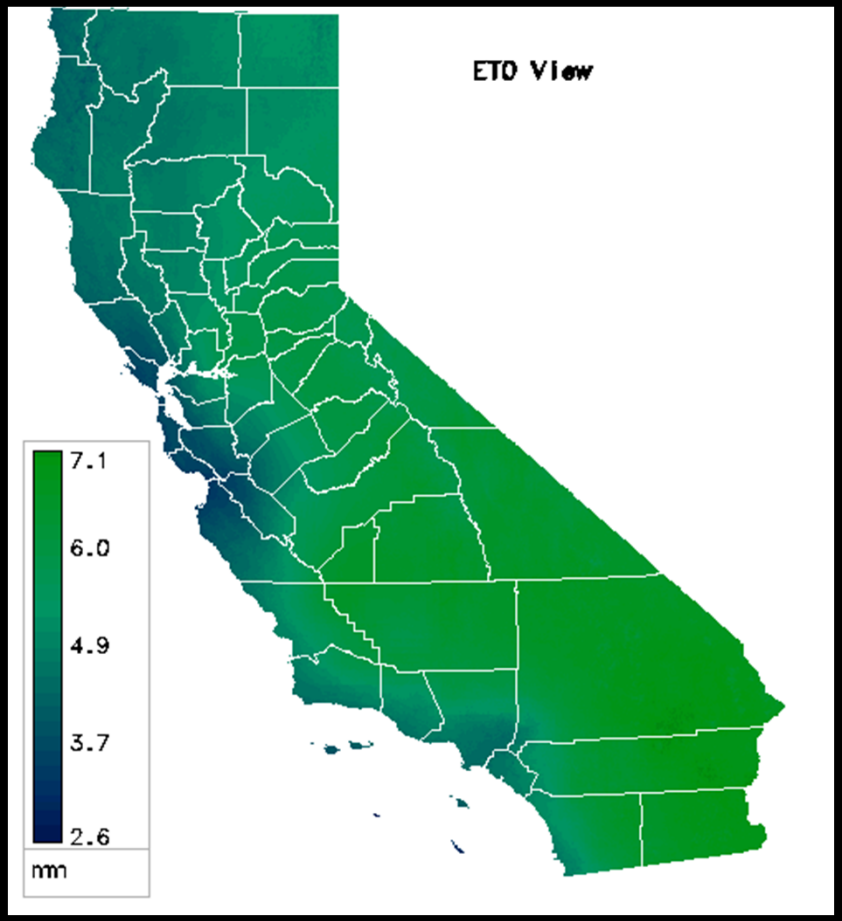
# Evapotranspiracion




**Factores**

- Clima
- Tipo de Cultivo
- Condiciones ambientales

# Evapotranspiracion

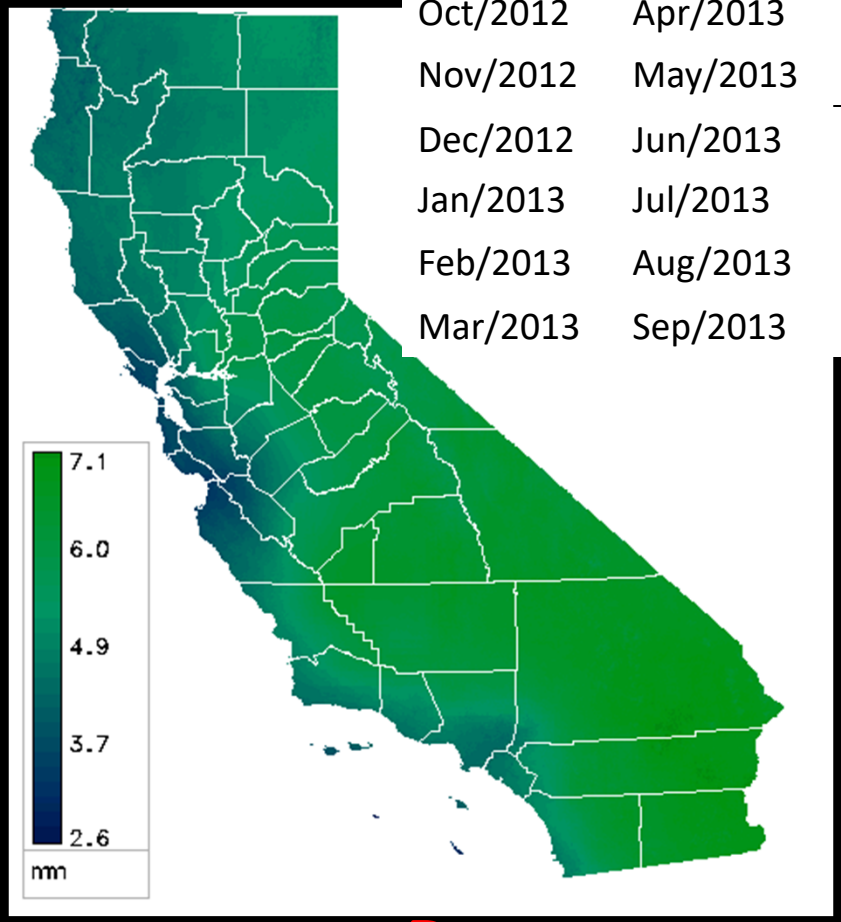



Oct/15/2012
Nov/15/2012
Dec/15/2012
Jan/15/2013
Feb/15/2013
Mar/15/2013
Apr/15/2013
May/15/2013
Jun/15/2013
Jul/15/2013
Aug/15/2013
Sep/15/2013

* CIMIS (2012). “ETo Map” <http://wwwcimis.water.ca.gov/cimis/cimiSatRptMap.jsp?urlVCR=hforward&urlImg=eto>

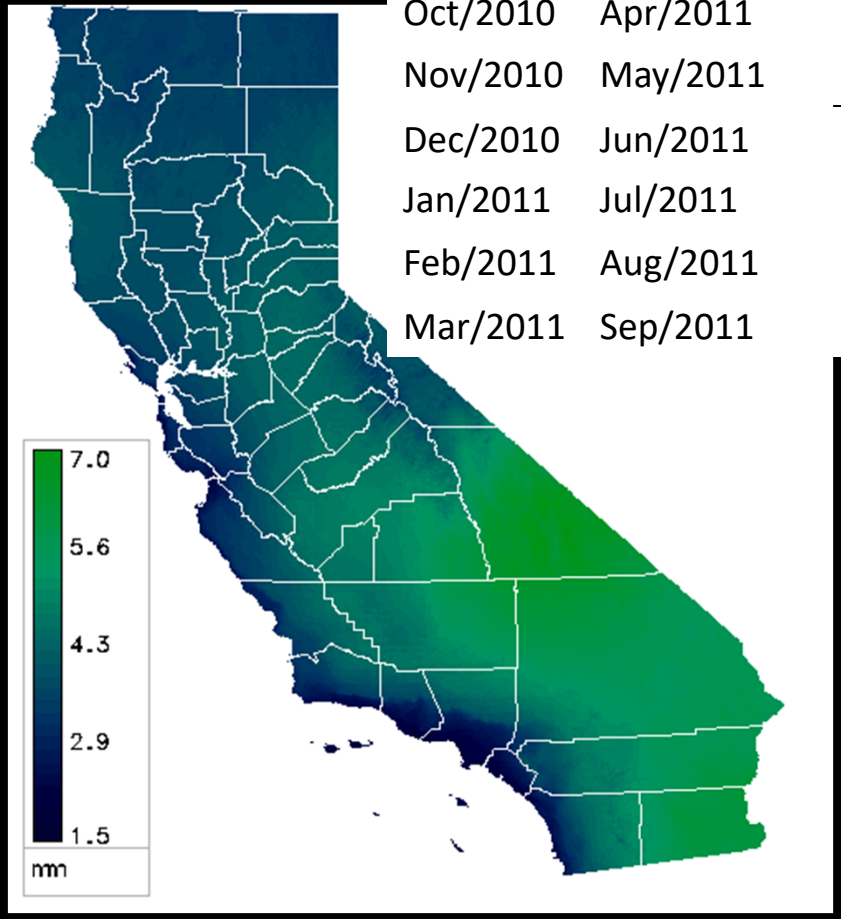
# Evapotranspiracion

| | |
|---|---|
| Oct/2012 | Apr/2013 |
| Nov/2012 | May/2013 |
| Dec/2012 | Jun/2013 |
| Jan/2013 | Jul/2013 |
| Feb/2013 | Aug/2013 |
| Mar/2013 | Sep/2013 |




**Dry**

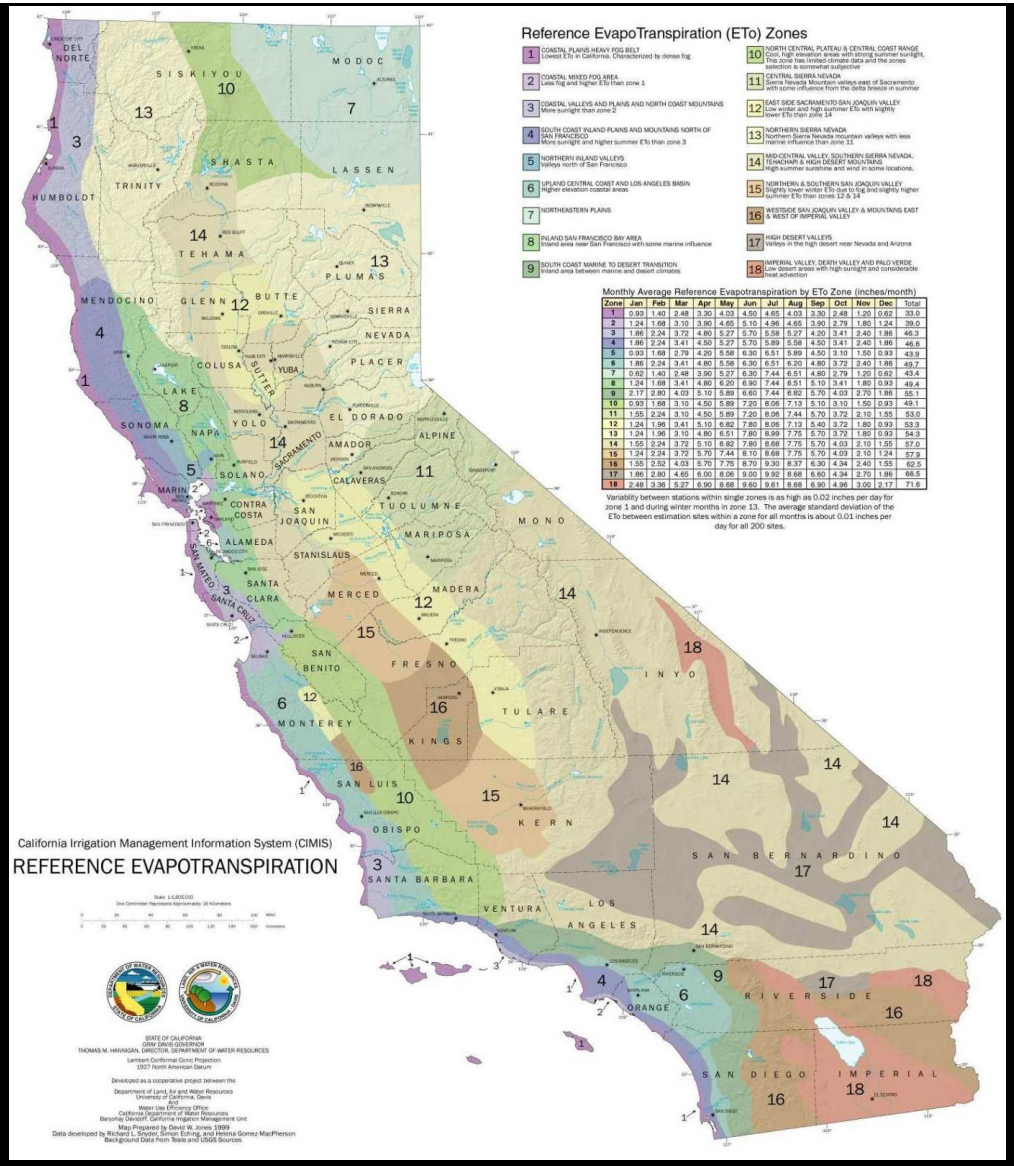
| | |
|---|---|
| Oct/2010 | Apr/2011 |
| Nov/2010 | May/2011 |
| Dec/2010 | Jun/2011 |
| Jan/2011 | Jul/2011 |
| Feb/2011 | Aug/2011 |
| Mar/2011 | Sep/2011 |




**Wet**

* CIMIS (2012). “ETo Map” <http://wwwcimis.water.ca.gov/cimis/cimiSatRptMap.jsp?urlVCR=hforward&urlImg=eto>

# Evapotranspiracion de referencia



# Evapotranspiracion del cultivo

$ET_0$ X Kc = $ET_C$

Unit: feet

| Month | Evapotranspira 0.5 Normal |
|---|---|
| 1 | 0.15 |
| 2 | 0.18 |
| 3 | 0.29 |
| 4 | 0.38 |
| 5 | 0.43 |
| 6 | 0.46 |
| 7 | 0.43 |
| 8 | 0.40 |
| 9 | 0.33 |
| 10 | 0.27 |
| 11 | 0.17 |
| 12 | 0.14 |
| | **3.63** |

| Month | Strawberries |
|---|---|
| 1 | 0.5 |
| 2 | 0.6 |
| 3 | 1 |
| 4 | 0.85 |
| 5 | 0.65 |
| 6 | 0.6 |
| 7 | 1 |
| 8 | 0.9 |
| 9 | 0.6 |
| 10 | 1.05 |
| 11 | 0.9 |
| 12 | 0.6 |

| Strawberries (ft) |
|---|
| 0.07 |
| 0.11 |
| 0.29 |
| 0.32 |
| 0.28 |
| 0.27 |
| 0.43 |
| 0.36 |
| 0.20 |
| 0.29 |
| 0.15 |
| 0.08 |
| **2.86** |

# Evapotranspiracion Neta

$ET_C$ - Precipitacion = Net $ET_C$

| | |
|---|---|
| Strawberries | |
| (ft) | |
| 0.07 | |
| 0.11 | |
| 0.29 | |
| 0.32 | |
| 0.28 | |
| 0.27 | |
| 0.43 | |
| 0.36 | |
| 0.20 | |
| 0.29 | |
| 0.15 | |
| 0.08 | |
| **2.86** | |

| | Precip |
|---|---|
| | 0.5 |
| **Month** | Normal |
| 1 | 0.43 |
| 2 | 0.41 |
| 3 | 0.28 |
| 4 | 0.15 |
| 5 | 0.07 |
| 6 | 0.01 |
| 7 | 0.01 |
| 8 | 0.00 |
| 9 | 0.03 |
| 10 | 0.09 |
| 11 | 0.24 |
| 12 | 0.37 |
| | **2.11** |

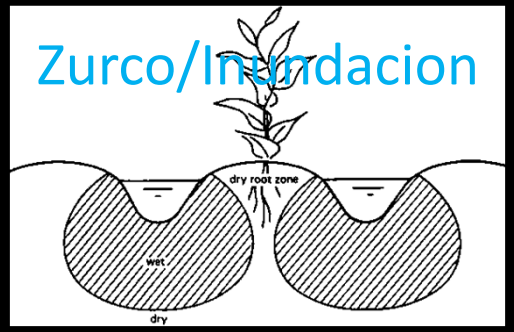
| | Net ETc |
|---|---|
| | 0.5 |
| **Month** | Normal |
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.01 |
| 4 | 0.18 |
| 5 | 0.21 |
| 6 | 0.26 |
| 7 | 0.42 |
| 8 | 0.36 |
| 9 | 0.17 |
| 10 | 0.19 |
| 11 | 0.00 |
| 12 | 0.00 |
| | **1.79** |

# Eficiencia de Riego

| Irrigation System | Application Efficiencies (%) Low | Mean | High |
|---|---|---|---|
| ***Surface Irrigation*** | | | |
| Wild Flood | 50 | 68 | 86 |
| Border | 62 | 73 | 83 |
| Basin | 72 | 83 | 93 |
| Furrow | 60 | 73 | 85 |
| Surface – Sprinkler Side-Roll | 60 | 68 | 75 |
| Surface – Sprinkler Hand- Move | 60 | 68 | 75 |
| ***Sprinkler*** | | | |
| Permanent | 70 | 78 | 85 |
| Hand-Move | 60 | 70 | 80 |
| Linear-Move | 73 | 82 | 90 |
| Side-Roll | 60 | 70 | 80 |
| Micro-Mini | 73 | 81 | 88 |
| Hose-Pull | 70 | 73 | 75 |
| Center –Pivot | 70 | 80 | 90 |
| ***Drip*** | | | |
| Above ground | 77 | 86 | 95 |
| Buried drip | 77 | 86 | 95 |

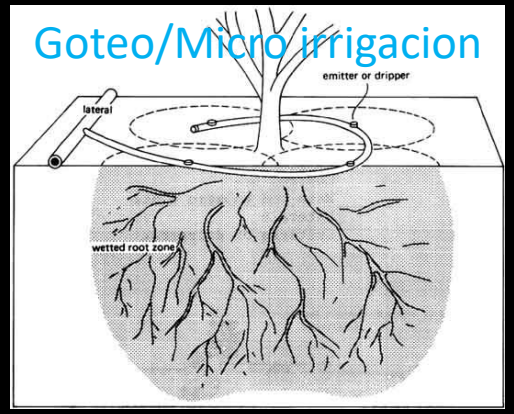
# Eficiencia en la irrigacion

Zurco/Inundacion

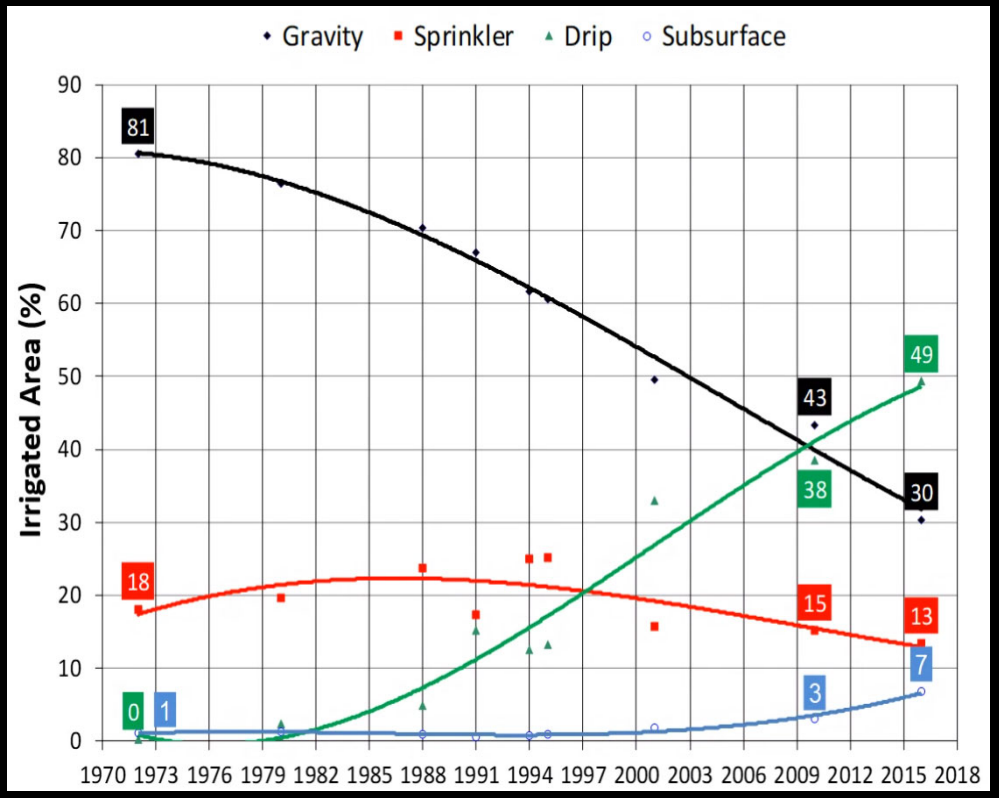




Goteo/Micro irrigacion







# Agua para riego

Net $ET_C$ ÷ Efficiencia de Riego = $AW_C$

| Month | Net ETc |
|---|---|
| | 0.5 |
| | Normal |
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.01 |
| 4 | 0.18 |
| 5 | 0.21 |
| 6 | 0.26 |
| 7 | 0.42 |
| 8 | 0.36 |
| 9 | 0.17 |
| 10 | 0.19 |
| 11 | 0.00 |
| 12 | 0.00 |
| | **1.79** |

÷ 0.9 =

| Month | AW |
|---|---|
| | 0.5 |
| | Normal |
| 1 | 0.00 |
| 2 | 0.00 |
| 3 | 0.01 |
| 4 | 0.20 |
| 5 | 0.24 |
| 6 | 0.29 |
| 7 | 0.47 |
| 8 | 0.40 |
| 9 | 0.19 |
| 10 | 0.21 |
| 11 | 0.00 |
| 12 | 0.00 |
| | **1.99** |

# Gracias


*“Usa el agua que necesites, pero ni una gota mas”*
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watermanagement.ucdavis.edu

# Recursos disponibles

- Para Evapotranspiracion. California Irrigation Management Information System: https://cimis.water.ca.gov/
- WUCOLS - Base de Datos para saber evapotranspiracion de plantas ornamentales: https://ccuh.ucdavis.edu/wucols-db
- Hoja de Calculo para estimar tiempo de irrigación:

https://docs.google.com/spreadsheets/d/1Raq1H-i94NyjTTBTo858Y_Y_CJvMihka/edit?usp=sharing&ouid=117877292048573953653&rtpof=true&sd=true

https://www.dropbox.com/scl/fi/6iukkt46401xpmmptx92h/Irrigation-Time-Calculator_Landscape-Trees-and-Vegetables.xlsm?dl=0&rlkey=90wcdab6robsd34sjz4cdnidn

- Recursos para entender conceptos básicos de hidrología: https://watermanagement.ucdavis.edu/cooperative-extension/hydrology-and-climate-change/hidrologia-y-cambio-climatico/
- Video en Youtube que explica irrigacion: https://youtu.be/QUqtnFROpxw