CALIFORNIA CROP AND SOIL EVAPOTRANSPIRATION





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CALIFORNIA CROP AND SOIL EVAPOTRANSPIRATION For Water Balances and Irrigation Scheduling/Design

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FOREWORD

Crop and soil (field) evapotranspiration values presented in this publication (ITRC Report 03-001) were developed in 2002 by the Cal Poly Irrigation Training and Research Center (ITRC) for the report "Evaporation from Irrigated Agricultural Land in California" (ITRC Report 02-001), funded by CALFED and CSU/ARI.

ITRC Report 03-001 is targeted for people who need estimates of crop and soil evapotranspiration and crop/soil coefficients for specific irrigation types and precipitation amounts.

What you will find in this publication

This publication presents evapotranspiration for crops and soils in 13 California Dept. of Water Resources (DWR) Reference Evapotranspiration Zones (ETo Zones) for three types of precipitation years (typical, wet, and dry) on a 12 month basis. For persons interested in *irrigation scheduling and system design*, the publication includes instructions on how to adjust ET values for (i) different irrigation systems, and (ii) different growing seasons. It also includes instructions, for persons doing regional or irrigation district *water balances*, on how to adjust values for (i) bare spots and decreased plant vigor, and (ii) multiple crops on the same field.

One of the main purposes of this publication is to provide California water users with crop/soil ET values that take into account regional environmental and management differences. Furthermore, with the ETo and crop/soil ET information presented in each table, crop coefficients can be calculated with relative ease for regions throughout California.

This publication provides the most comprehensive crop/soil ET values available to date for California.

What you will not find in this publication

This publication is not a guide to irrigation scheduling, which requires an understanding of labor constraints, irrigation system distribution uniformity, and other factors.

ACKNOWLEDGEMENTS

The Cal Poly Irrigation Training and Research Center gratefully acknowledges Dr. Richard Allen of Univ. of Idaho for developing the initial crop and soil evapotranspiration model, described in FAO Irrigation and Drainage Paper No. 56, which was used to develop the values in this report.

Initial research and development of the evapotranspiration values was funded through two different contracts:

- 1. CALFED
- 2. The Agricultural Research Initiative of the California State University (CSU/ARI).

Funding for the preparation of this summary publication was provided through a California Department of Water Resources (DWR) contract.

DISCLAIMER

The ET values provided in this publication are best estimates based on specific information such as published ETo values, planting and harvest dates. However, these ET values are not exact. Actual crop and soil evapotranspiration will depend on plant vigor, frequency of irrigation and rainfall, growing season, and irrigation method. Canopy cover and cover crop health are also important ET factors for trees and vines.

Persons involved in irrigation scheduling should use a variety of reality checks. In particular, weather-based ET estimates should always be accompanied by in-field soil moisture verifications.

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INTRODUCTION

How to use this publication

The goal of this publication is to provide water users, consultants, water agency personnel, and others throughout California with information that will: (a) help individual water users with irrigation scheduling and system design and (b) help agricultural water agency personnel with water balances and future planning.

The tables in this publication represent the consolidation of results from thousands of annual ET simulations that accounted for crop, rainfall (wet, dry, or "typical"), soil, and irrigation method in each of 13 major ETo zones in California. The annual simulations used daily water balances at the soil surface, crop canopy, and soil root zone.

When using these tables, one must keep the following in mind:

- 1. The tables account for soil evaporation 365 days out of the year. Many other published ET tables ignore ET that occurs when a crop is not present.
- 2. The crop/soil ET values assume typical <u>surface</u> (furrow, border strip, and basin) irrigation management (except for grapes in Zones 3, 6, and 8, where drip irrigation is assumed). Procedures for adjusting the ET values for special conditions, various irrigation methods, etc. are explained in this publication and in the original ITRC Report 02-001 (found at www.itrc.org).
- 3. The ET values are given for <u>irrigation scheduling and system design</u> purposes. For persons interested in computing <u>water balances</u>, the ET values must be derated because in most fields there are some bare spots and areas with decreased vigor – meaning that the field <u>average</u> ET is less than the crop/soil ET in areas of the field with healthy crops.

The <u>tables</u> in this publication provide year-round daily estimates of the evapotranspiration (ET) for the *soil/crop system*. The <u>text</u> explains how to adjust those ET values for special circumstances.

Origin of Crop Coefficients

Many publications address the topic of crop evapotranspiration estimates. Recent publications meant for the water user community generally use the following equation to estimate Crop Evapotranspiration (ETc):

```
Crop Evapotranspiration = Kc \times ETo

Where

Kc = Crop Coefficient

ETo = Grass reference evapotranspiration
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The general idea is that if daily ETo information is available, and if one knows the appropriate "Kc" value, one can estimate daily ETc on a real-time basis.

ETo values

The California Irrigation Management Information System (CIMIS) collects weather data from calibrated weather stations at more than 100 sites throughout California. That hourly weather data is used to compute daily ETo values for each station, using a standardized formula (a modified Penman equation). Grass reference evapotranspiration (ETo) can be downloaded for CIMIS stations throughout California at <u>www.cimis.water.ca.gov/</u>. The ETo value depends upon the daily weather, which varies by location and date, and upon the specific formula used for calculation. For example, there have historically been differences in the ETo equations used in Arizona and California.

Kc values

Crop coefficients (Kc) have been developed for many crops. Tables of growing season Kc values generally include 3 key components, such as:

- $Kc_{initial}$ this Kc begins at the planting date and ends generally when the crop canopy is about 10% full.
- Kc_{mid} this Kc begins when the crop has approximately 60% canopy (depending on the crop) and ends in the later part of the season when the crop begins to enter the end of the season.
- Kc_{end} the Kc on the last day the crop is in the field or as the crop goes dormant.

In practice, appropriate crop coefficients for a specific crop vary by region, soil type, irrigation frequency and type, reference crop type, and a host of other factors that are specific to management practices and the environment. Maximum values are about 1.2, and minimum values are about 0.10

In short, in order to calculate crop evapotranspiration using the equation above, one must have the reference crop evapotranspiration (ETo) for one's region and a specific crop coefficient depending on one's crop, region, soil type, irrigation type, etc. However, in most cases, only one set of crop coefficients per region is provided, which may not match the particulars of your situation, and if you have an unusual crop for the region, there may not be any coefficients available at all. This dilemma was addressed in FAO Irrigation and Drainage Publication No. 56. Dr. Richard Allen and the other authors laid out a procedure called the "dual crop coefficient" method of calculating ETc. This method uses a basal crop coefficient (Kcb – a crop coefficient calculated from a crop that is not stressed and has no surface wetting). Therefore, in theory, the Kcb is transferable anywhere in the world and from field-to-field, regardless of irrigation practices.

The challenge is in taking published Kcb values and converting them to Kc values, so that actual crop ET values can be computed using ETo data. This is done by adjusting the Kcb values using two other coefficients, one for evaporation (Ke) and another for crop stress (Ks).

The drawback of this method, from a user's standpoint, is that the calculations for Ks and Ke require examining daily water balances of the soil profile. Even with a computer program to do this, it can be a significant task.

This publication allows the user to bypass computations using ETo and crop coefficients. Using a program written by Dr. Allen and modified by the Cal Poly Irrigation Training and Research Center (ITRC), ETc values were modeled for "average" cropping situations throughout California. The resulting ETc estimates have been compiled in this publication for the convenience of the user.

The tables in this report present crop and soil evapotranspiration values for healthy crops throughout the state - which may include stress at certain stages of growth (e.g., processing tomatoes and cotton are generally stressed prior to harvest). The information is for *irrigation scheduling* and irrigation system design purposes. If, however, a water agency wants to analyze the actual average *field* evapotranspiration of a crop for water balance purposes, the values in the tables should be adjusted to account for bare spots and decreased vigor. This will be explained in more detail in a later section. The remainder of this report will explain how to use the ET values presented in the final tables.

IRRIGATION SCHEDULING AND SYSTEM DESIGN

The tables in this publication assume typical well-managed crops. Design and scheduling should be based on well-managed crops and include factors for irrigation system non-uniformity, plus time margins for off-peak pumping, spraying, and other procedures.

For an irrigation system design, two values from these tables are necessary: the peak monthly ET, and the annual ET of irrigation water. The peak monthly ET rate will typically determine the pumping capacity needed (after adjustment for non-uniformity, etc.). The annual ET of irrigation water is used in computations of annual pumping bills, which impacts the economic choice of pipe and valve sizes.

The off-season ET values can assist irrigation schedulers in estimating the soil water content at the beginning of the season. Off-season ET (evaporation from bare soil, evaporation and transpiration if a cover crop is present) is primarily from the top 5-7 inches of the soil profile when cover crops are not present. If a precipitation event is not significant enough to refill this layer, the majority of precipitation from that event will likely evaporate.

For these tables, annual crops throughout California were modeled with preirrigations 20-45 days before the planting date. For this reason, the evapotranspiration value one month before planting is relatively significant since it indicates evaporation from the bare soil evaporation layer.

For the most part, the values in the tables do not account for double or triple cropping. An exception is the crop category "Small Vegetables", which does account for double cropping. For most ETo Zones, this category was based on lettuce. Other small vegetables with similar basal crop coefficients, such as cabbage, broccoli, cauliflower, carrots, and celery, have also been grouped in this category and do not have separate listings.

The following instructions will show how to obtain appropriate values from the tables presented in this publication for irrigation scheduling and system design.



Cotton irrigated in California's San Joaquin Valley with gated pipe.

Step 1. Choosing a table

The first step in determining crop evapotranspiration is to choose the table or tables that represent your climate region and general precipitation year. Right before the ETc tables is the California Department of Water Resources (DWR) ETo Zone Map. There are three ETc tables for 13 of the 18 zones on the map (the remaining 5 zones did not have significant enough agricultural acreage to be included). The three tables for each zone differ by the amount of precipitation. For certain zones this will vary, but generally 1997 was a typical year, 1998 was a wet year, and 1999 was a dry year.

- a. First, select the zone number for your region of interest.
- b. For each year that you are interested in, determine the annual amount and timing of precipitation in the area for that year.
- c. Select the table that is representative of the amount and timing of precipitation in your region.

Some of the zones represent large areas that can have a wide variability in precipitation. For example, Zone 12 has a northern boundary in the Sacramento Valley and a southern boundary in Tulare and North Kern Counties. A typical year in the northern section may be a wet year in the southern region. Therefore, the terms Typical, Wet, and Dry are relative; it is up to the user to choose the appropriate table according to the amount of precipitation that actually occurred.

The monthly values of ETc that fall within the crop growing season are shown in **bold** for each crop in the table.



Onions grown with drip in the San Joaquin Valley.

Step 2. Adjusting for special conditions

Values may need to be adjusted to account for several special conditions:

- a. The use of sprinkler or drip/micro irrigation (except for grapes in Zones 3, 6, and 8, where drip irrigation is already assumed).
- b. Double or triple cropping of any crops that do not fall into the "Small Vegetables" category.
- c. Growing season dates that vary from the dates used in the tables.

These procedures are described in a later section of this report.

Step 3. Using the tabular values

The information in this publication can be a useful tool for irrigation scheduling purposes. However, the values in any ETc tables always have a confidence interval. With the use of any ETc values for irrigation scheduling, the scheduler must always conduct field checks to verify how well the scheduling is working.

WATER BALANCES AND PLANNING

As mentioned earlier, the values in this publication assume a typical well-managed crop that has uniform cover and vigor across the field. For irrigation scheduling and design purposes, those <u>depth</u> values should be used. However, when accounting for water destinations in <u>water balances</u>, one is interested in the <u>volume</u> of water <u>actually</u> <u>consumed</u> as crop and soil evapotranspiration due to actual crop growth, not ideally uniform growth. Since there are almost always some bare spots in a field, or areas with poor vigor, the ideal values presented in these tables must be adjusted downward when computing a water balance. <u>On the average</u>, the *actual* ET <u>depth</u> is less over the whole field than the ideal crop ET for which one schedules.

Research by the ITRC has concluded that for the average cropping situation in California, irrigation scheduling crop/soil evapotranspiration (ETc) should be reduced 7-8% when calculating water balances. Some of the reasons for decreased vigor and bare spots include, but are not limited to, salinity, irrigation and fertilizer distribution non-uniformity, crop damage caused by machinery (including the building of ditches for surface irrigation), pest and disease damage, soil variability, high water table, poor initial crop stand, etc.

For water balance purposes, it is also important to account for evaporation (and transpiration if there are cover crops) during the non-growing season. This off-season information is already included in the tables in this publication. The tables have evapotranspiration values for each crop on a 12-month basis. Of course, many crops do not have a 12-month growing period. The values in the table that are outside of the crop's growing season signify evaporation (and transpiration if there are cover crops) during the off-season. ETc values that fall within the crop growing season are shown in **bold**.

For the most part, the values in the tables do not account for double or triple cropping. An exception is the crop category "Small Vegetables", which does account for double cropping (two crops grown back-to-back). For most ETo Zones, this category was based on lettuce. Other small vegetables with similar basal crop coefficients, such as cabbage, broccoli, cauliflower, carrots, and celery, have also been grouped in this category and do not have separate listings in the tables. Further instructions in the following section will show how double and triple cropping can be taken into account in other cropping situations.

Step 1. Choosing a table

The first step in determining the evapotranspiration component of a water balance is to choose the table or tables that represent your climate region and general precipitation year. Right before the ETc tables is the California Department of Water Resources (DWR) ETo Zone Map. There are three ETc tables for 13 of the 18 zones on the map (the remaining 5 zones did not have significant enough agricultural acreage to be included). The three tables for each zone differ by the amount of precipitation. For certain zones this will vary, but generally 1997 was a typical year, 1998 was a wet year, and 1999 was a dry year.

- a. First, find the zone(s) that represent your water agency.
- b. For each year that you are interested in, determine the annual amount of precipitation in your region.

c. Select the tables that are representative of the amount and timing of precipitation in your region.

Some of the zones represent large areas that can have a wide variability in precipitation. For example, Zone 12 has a northern boundary in the Sacramento Valley and a southern boundary in Tulare and North Kern Counties. A typical year in the northern section may be a wet year in the southern region. Therefore, the terms Typical, Wet, and Dry are relative; it is up to the user to choose the appropriate table based on the amount of precipitation that actually occurred in the year being modeled.

Step 2. Adjusting for bare spots and decreased vigor

There are two ways to "adjust" the field ET values for bare spots and decreased vigor:

1. As mentioned above, ITRC has found that a good approximation is that the table values should be decreased by 7-8%. If you want to have a better estimate of the appropriate adjustments factors, it is necessary to obtain aerial photos of the fields in question. The aerial photos can be used to

estimate the percentages of fields that are bare or with reduced vigor. The aerial photos should be combined with field visits for verification.

 Download "approximate" values in spreadsheet format from the ITRC website: <u>www.itrc.org/ETWeb/WBandISHomePage.htm</u>. If the tables are downloaded from the *Water Balance* section of the web page, adjustments for bare spots and decreased vigor have already been taken into account.

Step 3. Adjusting for special conditions

See the following section for details on how to make adjustments to account for:

- a. The use of sprinkler or drip/micro irrigation (except for grapes in Zones 3, 6, and 8, where drip irrigation is already assumed).
- b. Double or triple cropping of any crops that do not fall into the "Small Vegetables" category.
- c. Growing season dates that vary from the dates used in the tables.



Grapevines growing on the east side of the Central Valley.

USING THE TABLES IN MORE DETAIL

Adjusting for Special Conditions

Sprinkler and drip/microspray irrigation

To limit the number of tables in this publication, only evapotranspiration values with surface (flood, furrow, basin, border strip) irrigation are presented (except for grapes in Zones 3, 6, and 8, where drip irrigation is assumed). Evapotranspiration from sprinkler and drip/micro irrigated crops can be directly downloaded from the ITRC website (www.itrc.org/ETWeb/WBandISHomePage.htm). The table below shows a range of multipliers that can be used to roughly adjust the values in this report to account for sprinkler and drip/micro irrigation. The actual ET will vary depending on the frequency of sprinkler and drip/micro irrigations. A crop with a higher irrigation frequency should use a higher multiplier. ETc will also vary depending on the surface wetting percentage. For example, microspray on trees often has a larger soil surface wetted area than drip irrigation, and therefore has a higher multiplier.

Table 1. Multipliers to adjust ETc based on irrigation method

Сгор Туре	Sprinkler	Drip/Micro	Subsurface Drip (SDI)
Orchards	1.01-1.03	1.03-1.06	0.95-0.98
Field crops	1.02-1.04	1.00-1.05	0.95-0.98

Accounting for double and triple cropping

Modifications to the tables are necessary when double and triple cropping is considered (unless the crop falls into the Small Vegetables category). When multiple crops are grown on a single field during a one-year period, the field is fallow or idle less time during the year than the table indicates. Therefore, there may be less evaporation during the off-season but more transpiration.

Double and triple cropping can be accounted for in a number of different ways. The way a water agency may approach this will depend on how crop acreage is accounted. Possibly the easiest way to account for double and triple cropping is to create multiple evapotranspiration tables, one for single crops and one for double and triple crops. The difference between the tables is that the single crop table will include off-season ET for all of the months that are not during the growing season. The double and triple crop table will only include growing season ET plus one month prior to planting to account for evaporation from pre-irrigation.



Small vegetables growing in Salinas Valley.

Example 1. Double Cropping in the Central San Joaquin Valley

Let's assume a field northwest of Bakersfield (ETo Zone 15) has a field that is double cropped with grain hay followed by silage corn.

The tables below illustrate how to estimate the crop and soil ET for each of these cropping situations. The top table represents the single cropping situation. The values highlighted in gray represent the ET one month prior to planting. This accounts for evaporation from the pre-irrigation.

In the middle table, many of the off-season ET values have been removed from the table to avoid duplication of values. However, May, September, and October all have 2 sets of ETc values.

						1993	7 (Typical)	(ear)					
	Лапиагу	February	March	April	May	June	July	August	September	October	November	Decemb er	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precip itation	3.46	0.39	0.07	0.59	0.01	0.33	0.01	0.00	0.02	0.33	1.91	1.28	8.40
Grass Reference ETo	0.95	2.30	4.38	6.30	8.18	8.18	8.35	7.33	5.72	4.04	1.58	1.09	58.41
Grain Hay and Corn	1.12	2.42	4.81	7.00	2.84	7.68	8.83	596	0.46	0.33	0.89	1.20	43.53

November	Octoher	Sentember	Y ear) Anonst	7 (Typical) Mulv	1993. Inne	Mav	Anri	March	VTCIL
			Y ear)	7 (Typical)	1997				

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double of	
Final	
Table 4.	

Final Cropping Table

	January	February	March	April	May	June	July	August	Sep tember	October	November	December	Ammal
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	3.46	0.39	0.07	0.59	0.01	0.33	0.01	00:0	0.02	0.33	1.91	1.28	8.40
Grass Reference ETo	0.95	2.30	4.38	6.30	8.18	8.18	8.35	7.33	5.72	4.04	1.58	1.09	58.41
Grain and Grain Hay	1.12	2.42	4.81	7.00	4.01	0.40	0.01	00:0	0.02	0.33	0.89	1.20	22.21
Corn and Gran Sorghum	1.11	0.92	1.20	1.83	2.84	7.68	8.83	596	0.46	0.33	0.86	1.14	33.17

1997 (Typical Year)

Single Cropping Table

Double Cropping Table

Table 3. <u>Double cropping</u> intermediate table for Example 1	

Amnual inches

> inches 1.28

inches

inches

inches 0.02

August inches 0.00

June inches

May

April inches

March inches 0.07 4.38

January February inches 0.39

inches

1997 (Typical Year) , July inches

0.33 4.04

5.72

7.33

0.0 333

0.33 8.18

0.01 8.18

0.59 6.30

inches

September October November December

58.40

1.09

21.79

120

0.89 1.58 1.91

0.33

0.02

596

8.83

7.68

4.01 2.84

7,00

4.81

2.42

1.12

Grain and Grain Hay Corn and Grain Sorghum

2.30

3.46 0.95

Grass Reference ETo Precipitation

The values highlighted in gray indicate the ET one month prior to planting, which accounts for evaporation from pre-irrigation.

The **bold** values indicate ET during the crop growing season.
 The values highlighted in management in a season.

Table 2. <u>Single cropping</u> table for Example 1

One of the major discrepancies in the double cropping table above is that the growing seasons overlap. This is because the tables were generated using average planting and harvest dates for each region. There are a number of logical methods to adjust these values to reflect reality in your situation. One way is to adjust the planting and harvest dates, which will be explained in the next section. Another way is to assume that if corn is following grain hay, the grain hay will be removed earlier, say in late April. Therefore, one can remove the ET value for grain hay in May. However, in most cases, the error will not have a significant impact on the overall evapotranspiration value and the values can be left as they are.

Adjusting growing season dates

The tables in this report were generated using from University of information California Cooperative Extension Crop Calendars, water agency crop calendars, farmer interviews, and ITRC experience. Each source had one thing in common: they all presented a range of beginning and end of growing season dates. ITRC used an average of these dates for the tables presented in this report. It is understood that actual dates will vary; this means the evapotranspiration from the crop will also vary. With some work, the values in these tables can be adjusted to be more representative of specific regions.

The basic steps to adjust the ETc values are these:

1. Compute the monthly Kc values for the crop in your ETo zone (and year of interest).

$$Kc = \frac{ETc}{ETo}$$

In each of the tables, a row near the top represents the monthly ETo that was used to calculate the ETc values in that table. Dividing the monthly ETc by the monthly ETo for the same month gives the monthly crop coefficient (Kc). This should be done for each of the months during the growing season.

2. Recognize that the Kc values are primarily impacted by (a) the crop stage of growth, and (b) the availability of rainfall that would wet the soil surface, if a crop is not growing then.



Alfalfa growing in Imperial Valley near El Centro, California.

3. Use the appropriate Kc values that reflect the actual crop planting and harvest dates, together with the ETo for those months, to compute the adjusted monthly ETc values <u>during the growing</u> season and the month prior to planting.

Crop $Evapotranspiration(ETc) = Kc \times ETo$

4. The off-season months for the crop with new growing season should be replaced with the "Idle" evaporation values for the appropriate months.

Example 2. Adjusting the beginning and end of the growing season

Let's take for example lettuce in the Salinas Valley (Zone 6) for a wet year. All tables in this publication assume double cropping of small vegetables back to back, so there are actually 2 crops in a row for small vegetables. The planting date for Zone 6 is in mid-January with pre-irrigations starting in December. The harvest of the second crop is in early-mid July.

In this example, a local water agency wishes to estimate the evapotranspiration of 2 lettuce crops with the first crop planted in March instead of January. For simplicity of illustration, the second crop growing season length is assumed to remain the same in this example, although in reality crop growing season lengths change depending upon planting dates.

The 2 lettuce crops are planted back-to-back in both cases. The table below shows how to adjust the planting dates by using the ETc values during the growing season to determine crop coefficients (Kc), and multiplying the Kc values by their respective monthly ETo values in the new growing season.

dates
season
rowing
ofg
end
and
ginning :
of beg
adjustment
Example
Table 5.

Notes:

- 1. Small vegetables are presented in the tables with a planting date in January but the user want to change the planting date to March.
- Small vegetables are presented as back-to-back double crops (2 crops). The December value (gray) in the original row and the February value (gray) in the New Season row represent pre-irrigation evaporation. ä

						199	18 (Wet Ye	ar)					
	Jamary	February	March	April	May	June	յել	August	September	October	November]	December	Annal
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	5.02	10.54	3.20	1.57	1.92	0.21	0.0	0.05	0.17	0.39	1.94	0.65	25.66
Grass Reference (ETo)	1.56	1.33	3.17	4.33	4.98	5.28	6.51	6.29	4.32	3.74	2.00	1.91	45.65
Small Vegetab les (ETc)	1.71	1.80	3.40	3.58	426	5.46	2.10	0.05	0.17	0.36	0.91	1.17	25.04
$\mathbf{K}\mathbf{c} = \mathbf{E}\mathbf{T}\mathbf{c}/\mathbf{E}\mathbf{T}\mathbf{o}$	1.14	1.18	1.07	0.83	0.86	L03	0.32					0.61	
New Season Small Vegetable ETc	1.67	0.94	3.60	5.11	5.34	436	5.57	6.50	1.40	0.36	0.91	1.18	35.27
Idle	1.67	1.81	2.01	1.94	1.82	0.25	0.0	0.05	0.17	0.36	16:0	1.18	12.16

Example Calculation – New Season Small Vegetable ETc for April

Where

Kc computed for the second month of the growing season in the table (Feb) = 1.18ETo for April = 4.33 inches

= Kc x ETo = 1.18×4.33 inches = 5.1 inches ETc

Calculating Crop Coefficients from the Tables

Typical crop coefficients can be calculated from the tables in this publication. Those Kc values can then be used to calculate crop <u>and</u> soil evapotranspiration for any other year by using current grass reference evapotranspiration (ETo) data from a local weather station. This can be beneficial for both water balances and irrigation scheduling purposes.

Monthly crop coefficients (Kc) can be calculated from the tables by using the following equation:

$$Kc = \frac{ETc}{ETo}$$

In the tables in this report, ETc (field evapotranspiration) values are presented by month in the columns to the right of the crop category (in inches). ETo values are presented at the top of each table for that ETo zone and year (in inches).

For example, using cotton in Zone 15 for a "typical" year in July (ETc Table 11),

ETo = 8.35 inches
ETc = 7.32
$$Kc = \frac{ETc}{ETo} = \frac{7.32"}{8.35"} = .88$$

It is important to understand the conditions under which the crop coefficients were derived. This is for surface irrigation, which because of its periodic frequency, will stress the crop somewhat. Furthermore, the soil surface will only be wet for a few days once every 2 weeks or so, so the evaporation is not high. Finally, these values assume no cover crop. More frequent irrigation and a cover crop would both increase the ETc and, therefore, the Kc would be higher.

This Kc value could be used to estimate the ETc for the same conditions in another year as:

Monthly $ETc_{(predicted)} = Kc_{(computed from the tables)} \times ETo_{(CIMIS)}$

Grass reference evapotranspiration (ETo) can be downloaded for CIMIS (California Irrigation Management Information Systems) stations throughout California at www.cimis.water.ca.gov/. By using monthly ETo values from CIMIS and the crop coefficients calculated from the tables in this publication, the user can determine the monthly ETc for a crop, for a different year, but with the same month and location. For example, assume that in another year the ETo was 8.7" during July, and all other conditions remained the same.

> Then, ETc = Kc x ETo ETc = .88 x 8.7" = 7.7"

Effective Precipitation

ETc includes both crop and soil ET. Soil evaporation occurs even when a field is bare. The water for evaporation may originate from rain or from irrigation. In practice, it is difficult to partition the rain and irrigation components of ET. Typically, a value of "effective precipitation" is assigned to the depth of rainfall that contributes to "crop ET", where "crop ET" is usually a value that occurs between crop planting and harvesting dates. However, these values are usually very loosely assigned, and things become confusing when pre-irrigations occur along with rainfall. This report does not provide "effective precipitation" values. Instead, it provides the total E and T estimates of precipitation water for each zone, for each of 3 rainfall years. Those values can be found in **Tables 40-43**. As with all other values in this report, the E and T contributions of precipitation are based upon a complete calendar year, rather than just the crop growing season. The "crop ET" values and "crop coefficient" values in this report may be correctly considered to be "field ET" and "field coefficient" values.

CROPAND SOIL EVAPOTRANSPIRATION TABLES

The following evapotranspiration tables are in sequential order by ETo Zone. There are 3 tables per Zone representing typical, wet, and dry precipitation calendar years. All values presented in the following tables are shown to the 100th of an inch. This does not suggest that the values are accurate to this level. They are only presented to this level to minimize rounding errors when crop coefficients are calculated.

The tables presented assume <u>surface</u> irrigation for all crops except grapevines grown in ETo Zones 3, 6, and 8, where <u>drip</u> irrigation is assumed.

List of ETc Tables

ETc Tables 1-13 – Typical Precipitation Year ETc Tables 14-26 – Wet Year ETc Tables 27-39 – Dry Year ETc Tables 40-43 – E and T from Precipitation



Citrus grows on the south and central coast, the San Joaquin Valley, and in the deserts of southern California.



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Zone 1 Monthly Evapotranspiration Surface Irrigation Typical Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Ohispo

Table does not include adjustments for hare spots and reduced vigor

	January	February	March	April	May	June	July	August	September	October	November	Decem
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inch
Precipitation	6.85	0.12	0.28	0.43	0.04	0.08	00'0	0.08	0.00	0.75	6.22	3.62
Grass Reference ETo	1.09	2.15	3.32	4.68	5.50	5.58	3.67	3.79	3.84	2.86	1.37	1.32
Apple, Pear, Cherry, Plum and Prune	1.20	0.68	0.65	1.45	2.61	4.06	3.24	3.10	3.33	2.55	08.0	1.14
Apples, Plums, Cherries etc w/covercrop	1.20	2.27	2.90	3.65	5.19	5.63	3.83	3.97	4.08	2.86	1.30	1.52
Peach, Nectarine and Apricots	1.20	0.68	0.65	1.49	3.15	4.72	3.08	3.17	3.24	2.61	0.85	1.12
Immature Peaches, Nectarines, etc	1.22	0.67	0.47	0.95	1.57	2.31	1.65	1.57	1.57	1.87	0.81	1.12
Misc. Deciduous	1.20	0.68	0.94	1.74	3.49	4.49	3.05	2.87	3.35	2.57	1.25	1.12
Grain and Grain Hay	1.28	2.39	3.70	5.14	2.88	0.10	00'0	80'0	0.00	1.33	0.87	1.35
Corn and Grain Sorghum	1.28	0.64	1.24	1.52	1.27	4.75	4.01	3.47	0.66	0.69	0.82	1.1
Misc. field crops	1.28	1.28	0.57	1.46	4.18	5.28	3.41	1.25	0.00	0.68	0.82	1.1
Alfalfa Hay and Clover	1.28	2.22	3.28	4.18	5.10	5.16	3.22	3.74	3.57	2.13	1.23	1.5
Pasture and Misc. Grasses	1.28	1.48	2.03	4.03	5.25	5.24	3.45	3.64	3.60	2.87	1.46	1.1
Small Vegetables	1.28	1.66	3.34	3.67	3.09	5.74	1.97	0.08	0.00	0.68	0.82	1.1
Tomatoes and Peppers	1.28	0.83	0.77	2.19	5.47	5.89	3.74	1.38	0.00	0.68	0.82	1.17
Potatoes, Sugar beets, Turnip etc.	1.28	0.64	0.97	1.17	1.01	3.07	3.39	4.26	4.28	3.28	1.57	1.4
Melons, Squash, and Cucumbers	1.28	1.29	0.88	2.09	5.47	5.54	2.04	0.08	0.00	0.68	0.82	1.1
Citrus (no ground cover)	1.20	2.12	2.46	3.44	3.37	3.55	2.05	2.33	2.39	2.23	1.19	1.48
Immature Citrus	1.22	1.37	1.25	1.75	1.71	1.75	1.03	1.07	1.12	1.53	1.03	1.3/
Avocado	1.20	0.68	0.94	1.74	3.49	4.49	3.05	2.87	3.35	2.57	1.25	1.1
Idle	1.31	0.63	0.28	0.42	0.06	0.08	0.00	0.08	0.00	0.68	0.85	1.18

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1997 (Typical Year)

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24.79 38.40 19.16 21.53 21.38 36.62 35.50 23.50

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25.97

15.79

Year
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Zone 3 Monthly Evapotranspiration

Surface Irrigation Typical Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and reduced vigor

	inches	inche										
Precipitation	3.46	0.39	0.07	0.59	0.01	0.33	0.01	00'0	0.02	0.33	1.91	1.28
Grass Reference ETo	0.95	2.30	4.38	6.30	8.18	8.18	8.35	7.33	5.72	4.04	1.58	1.09
Apple, Pear, Cherry, Plum and Prune	1.21	0.74	0.99	1.65	3.11	4.43	4.68	4.76	4.32	2.82	0.83	1.29
Apples, Plums, Cherries etc w/covercrop	1.22	2.60	3.40	4.16	6.01	6.16	5.64	5.81	5.42	3.52	1.42	1.84
Peach, Nectarine and Apricots	1.21	0.74	0.99	1.70	3.72	5.15	4.36	4.91	4.42	2.93	0.91	1.29
Immature Peaches, Nectarines, etc	1.22	0.74	0.78	1.10	1.95	2.43	2.46	2.38	2.86	1.68	0.80	1.29
Almonds	1.21	0.74	0.99	2.04	4.26	4.91	4.27	4.85	4.19	2.90	1.32	1.29
Almonds w/covercrop	1.22	2.27	2.78	3.72	5.94	5.77	5.05	5.48	4.80	3.38	1.29	1.77
Immature Almonds	1.22	0.74	0.78	1.26	2.23	2.32	2.54	2.37	2.72	1.69	1.04	1.29
Walnuts	1.21	0.74	0.57	1.38	2.78	4.69	5.02	5.37	4.95	3.10	1.30	1.29
Misc. Deciduous	1.21	0.74	1.31	1.99	4.14	4.93	4.22	4.83	4.21	3.09	1.36	1.29
Grain and Grain Hay	1.26	2.68	4.19	5.65	3.50	0.14	0.03	0.38	0.74	1.20	0.86	1.59
Safflower and Sunflower	1.25	1.00	1.80	4.74	7.00	5.96	1.71	0.38	0.74	0.49	0.83	1.31
Corn and Grain Sorghum	1.25	0.72	1.48	1.57	1.65	5.10	5.85	5.25	1.58	0.49	0.83	1.31
Misc. field crops	1.25	1.37	0.90	1.67	4.89	5.77	4.86	2.60	0.74	0.49	0.83	1.31
Alfalfa Hay and Clover	1.26	2.50	3.71	4.57	5.77	5.54	4.74	4.92	4.44	1.90	1.31	1.80
Pasture and Misc. Grasses	1.25	1.66	2.47	4.44	6.04	5.66	5.04	5.26	4.73	3.26	1.53	1.31
Small Vegetables	1.25	1.82	3.72	3.77	3.73	6.11	2.31	0.38	0.74	0.49	0.83	1.31
Tomatoes and Peppers	1.25	0.97	1.13	2.54	6.34	6.32	5.48	2.61	0.74	0.49	0.83	1.31
Potatoes, Sugar beets, Turnip etc	1.25	0.72	1.00	0.92	1.34	3.34	5.09	6.03	5.44	3.73	1.70	1.64
Melons, Squash, and Cucumbers	1.25	1.37	0.89	2.46	6.33	5.94	2.52	0.38	0.74	0.49	0.83	1.31
Onions and Garlic	1.26	2.34	3.54	4.92	5.45	1.36	0.03	0.38	0.74	0.49	1.46	1.49
Flowers, Nursery and Christmas Tree	1.21	0.74	1.31	1.99	4.14	4.93	4.22	4.83	4.21	3.09	1.36	1.29
Citrus (no ground cover)	1.22	2.38	2.94	3.81	3.94	3.79	3.12	3.62	3.37	2.60	1.24	1.76
Immature Citrus	1.23	1.52	1.66	1.96	2.11	1.90	1.46	1.84	2.26	1.41	1.01	1.55
Avocado	1.21	0.74	1.31	1.99	4.14	4.93	4.22	4.83	4.21	3.09	1.36	1.29
Grape with 40% cover	1.21	0.74	0.99	1.88	2.66	2.40	1.99	1.89	1.66	0.53	0.79	1.29
Grape with cover crop	1.23	1.64	1.91	2.70	3.24	2.88	2.52	2.69	2.59	1.73	1.06	1.59
Grape with 60% cover	1.21	0.74	0.99	2.38	3.92	3.60	3.02	2.62	1.95	0.53	0.79	1.29
Idle	1.26	0.71	0.57	0.50	0.25	0.12	0.03	0.38	0.73	0.49	0.85	1.31

42.45 42.64 30.00 32.18

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Annual

July August September October November December

1997 (Typical Year)

June

May

April

January February March

inches

8.40 58.41 43.45 20.20

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ETc Table for Irrigation Sch	eduling	and De	sign										
Zone 4 Monthly Evapotranspir	ation												
Surface Irrigation Typical Year													
IRRIGATION TRAINING AND RES	SEARCH	CENTER	t, Califon	nia Poly	technic S	State Un	iversity,	San Lui	is Obispo				
Table does not include adjustments for bare spo	ots and redu	ced vigor											
						195	7 (Typi	cal Year)					
	January	February	March	April	May	June	July	August	September	October	November]	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	6.21	0.29	0.34	0.30	0.49	0.22	0.07	0.31	0.43	0.65	4.92	4.29	18.52
Grass Reference ETo	1.53	2.43	3.44	4.82	5.74	5.79	5.92	5.70	4.78	3.58	1.56	1.74	47.04
Apple, Pear, Cherry, Plum and Prune	1.74	0.65	0.73	1.38	3.11	4.34	5.21	5.12	4.07	3.13	1.09	1.62	32.19
Apples, Plums, Cherries etc w/covercrop	1.79	2.61	3.01	3.77	5.64	5.97	6.21	6.11	5.34	3.60	1.51	2.09	47.64
Peach, Nectarine and Apricots	1.74	0.65	0.73	1.42	3.65	4.95	4.93	5.08	4.26	3.33	1.04	1.62	33.41
Immature Peaches, Nectarines, etc	1.75	0.65	0.54	0.85	2.08	2.46	2.71	2.46	2.56	1.88	1.02	1.62	20.57
Walnuts	1.74	0.65	0.35	1.14	2.77	4.61	5.62	5.59	4.82	3.42	1.49	1.62	33.81
Misc. Deciduous	1.74	0.65	1.03	1.70	3.94	4.81	4.78	5.02	4.03	3.33	1.45	1.62	34.10
Grain and Grain Hay	1.81	2.71	3.86	5.31	3.30	0.24	0.06	0.31	0.40	1.35	1.07	1.91	22.33
Com and Grain Sorghum	1.77	0.64	1.33	1.21	1.76	4.96	6.48	5.50	1.20	0.63	1.05	1.63	28.17
Misc. field crops	1.77	1.28	0.65	1.42	4.47	5.51	5.51	2.68	0.40	0.64	1.05	1.63	27.02
Alfalfa Hay and Clover	1.82	2.52	3.44	4.29	5.39	5.44	5.18	5.22	4.29	2.23	1.47	2.05	43.33
Pasture and Misc. Grasses	1.77	1.60	2.12	4.07	5.62	5.50	5.60	5.49	4.65	3.58	1.63	1.63	43.26
Small Vegetables	1.78	1.77	3.44	3.58	3.49	5.97	2.44	0.31	0.40	0.63	1.05	1.63	26.50
Tomatoes and Peppers	1.78	0.94	0.86	2.30	5.75	6.14	6.06	2.73	0.40	0.64	1.05	1.63	30.29
Melons, Squash, and Cucumbers	1.77	1.28	0.64	2.17	5.78	5.84	2.67	0.31	0.40	0.64	1.05	1.63	24.20
Onions and Garlic	1.81	2.35	3.23	4.59	5.03	1.45	0.06	0.31	0.40	0.64	1.62	1.84	23.32
Citrus (no ground cover)	1.79	2.38	2.57	3.44	3.82	3.82	3.47	3.73	3.11	2.84	1.42	2.05	34.44
Immature Citrus	1.79	1.47	1.35	1.67	2.10	1.96	1.76	1.89	1.94	1.57	1.20	1.90	20.61
Avocado	1.74	0.65	1.03	1.70	3.94	4.81	4.78	5.02	4.03	3.33	1.45	1.62	34.10
Idle	1.79	0.64	0.35	0.30	0.51	0.22	0.06	0.31	0.40	0.63	1.07	1.64	7.91

ETc Table 3. Zone 4 Typical Year

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Zone 6 Monthly Evapotranspiration

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	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	7.00	0.41	0.07	0.15	0.09	0.02	0.01	0.21	0.61	0.11	3.57	3.39	15.65
Grass Reference ETo	1.45	2.60	3.98	5.54	6.89	6.49	6.11	6.01	5.13	3.75	1.79	1.73	51.46
Apple, Pear, Cherry, Plum and Prune	1.61	0.74	0.56	1.41	3.23	4.84	5.17	5.36	4.57	2.75	1.16	1.34	32.72
Apples, Plums, Cherries etc w/covercrop	1.65	2.79	3.22	4.43	6.22	6.74	6.49	6.50	5.71	3.51	1.72	2.01	50.98
Peach, Nectarine and Apricots	1.61	0.74	0.56	1.47	4.01	5.53	5.11	5.17	4.75	2.93	1.17	1.34	34.37
Immature Peaches, Nectarines, etc	1.62	0.73	0.34	0.81	1.97	2.66	2.68	2.69	2.67	1.67	1.13	1.34	20.32
Almonds	1.61	0.74	0.56	1.85	4.51	5.47	4.72	5.13	4.58	2.91	1.55	1.34	34.95
Almonds w/covercrop	1.65	2.42	2.67	3.72	6.15	6.40	5.87	5.82	5.37	3.40	1.77	1.93	47.16
Immature Almonds	1.62	0.73	0.34	1.00	2.25	2.53	2.79	2.63	2.74	1.45	1.38	1.34	20.82
Walnuts	1.61	0.74	0.12	1.14	2.87	5.00	5.85	5.97	5.17	3.21	1.64	1.34	34.66
Mise. Deciduous	1.61	0.74	0.92	1.80	4.33	5.48	4.74	5.10	4.59	3.17	1.59	1.34	35.40
Grain and Grain Hay	1.71	2.90	4.45	60.9	3.81	0.04	0.01	0.23	0.61	0.86	1.16	1.72	23.59
Safflower and Sunflower	1.67	1.00	1.48	5.11	7.63	6.60	1.35	0.23	0.61	0.12	1.14	1.35	28.29
Corn and Grain Sorghum	1.67	0.71	1.19	1.16	1.70	5.43	6.71	5.63	1.36	0.12	1.14	1.35	28.17
Misc. field crops	1.67	1.36	0.47	1.53	5.40	6.13	5.65	2.39	0.61	0.12	1.14	1.35	27.81
Alfalfa Hay and Clover	1.71	2.69	3.73	4.86	6.30	5.91	5.34	5.50	4.65	1.80	1.64	1.98	46.13
Pasture and Misc. Grasses	1.67	1.71	2.24	4.75	6.52	6.15	5.78	5.77	5.00	3.60	1.89	1.35	46.42
Small Vegetables	1.69	1.88	4.01	3.81	4.31	6.66	2.45	0.23	0.61	0.12	1.14	1.35	28.27
Tomatoes and Peppers	1.68	1.05	0.72	2.51	6.88	6.96	6.25	2.61	0.61	0.12	1.14	1.35	31.88
Potatoes, Sugar beets, Turnip etc	1.67	0.71	0.72	0.63	1.27	3.67	5.82	6.68	5.75	4.22	2.04	1.79	34.99
Melons, Squash, and Cucumbers	1.67	1.36	0.45	2.52	6.90	6.45	2.88	0.23	0.61	0.12	1.14	1.35	25.68
Onions and Garlic	1.70	2.52	3.72	5.21	5.76	1.29	0.01	0.23	0.61	0.12	1.76	1.60	24.54
Citrus (no ground cover)	1.65	2.55	2.79	3.74	4.27	3.88	3.66	3.78	3.65	2.45	1.57	1.93	35.91
Immature Citrus	1.66	1.58	1.31	1.75	2.28	1.84	1.58	2.19	1.92	1.24	1.37	1.71	20.42
Avocado	1.61	0.74	0.92	1.80	4.33	5.48	4.74	5.10	4.59	3.17	1.59	1.34	35.40
Grape with 40% cover	1.61	0.73	0.56	1.73	2.90	2.65	2.36	1.99	1.64	0.15	1.09	1.34	18.75
Grape with cover crop	1.65	1.72	1.60	2.63	3.34	3.08	2.86	2.85	2.61	1.39	1.35	1.75	26.83
Grape with 60% cover	1.61	0.73	0.56	2.30	4.20	3.90	3.49	2.77	2.03	0.16	1.09	1.34	24.19
Idle	1.69	0.71	0.13	0.17	0.10	0.02	0.01	0.23	0.61	0.12	1.15	1.36	6.29

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Zone 8 Monthly Evapotranspiration

Surface Irrigation Typical Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include ad justments for h are spots and red uced vigor

						19. 19.	97 (Typid	cal Year)					
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	6.76	0.36	1.27	1.37	1.15	0.41	0.22	0.72	0.02	1.11	8.44	3.29	25.11
Grass Reference ETo	0.75	2.30	3.64	5.19	6.72	7.03	6.92	5.88	5.17	3.33	1.06	1.22	49.20
Apple, Pear, Cherry, Plum and Prune	0.85	0.99	1.50	2.49	4.36	6.15	6.52	5.95	4.87	3.19	0.68	1.13	38.68
Apples, Plums, Cherries etc w/covercrop	0.86	2.55	3.73	4.91	7.22	7.99	7.97	6.83	5.80	3.66	1.01	1.46	53.99
Peach, Nectarine and Apricots	0.85	0.99	1.50	2.54	5.11	6.91	6.53	5.89	4.87	3.36	0.66	1.13	40.34
Immature Peaches, Nectarines, etc	0.85	0.99	1.30	1.95	3.25	3.98	3.59	3.51	2.72	2.31	0.57	1.13	26.15
Almonds	0.85	0.99	1.50	2.89	5.64	6.87	6.39	5.53	4.94	3.17	0.92	1.13	40.82
Almonds w/covercrop	0.86	2.28	3.23	4.51	7.29	7.79	7.20	6.39	5.61	3.57	1.05	1.42	51.20
Immature Almonds	0.85	0.99	1.30	2.14	3.65	4.07	3.43	3.76	2.67	2.25	0.83	1.13	27.08
Walnuts	0.85	0.99	1.10	2.19	3.93	6.22	7.16	6.36	5.49	3.38	0.97	1.13	39.76
Misc. Deciduous	0.85	0.99	1.81	2.83	5.38	6.72	6.29	5.47	4.84	3.24	1.01	1.13	40.57
Grain and Grain Hay	0.89	2.66	4.21	5.93	4.37	0.47	0.18	0.77	0.02	1.58	0.61	1.31	22.99
Safflower and Sunflower	0.88	1.26	2.21	5.11	7.79	7.44	2.13	0.77	0.02	0.91	0.59	1.14	30.25
Corn and Grain Sorghum	0.88	0.97	1.98	2.40	2.61	6.56	8.06	6.13	0.85	0.91	0.59	1.14	33.08
Misc. field crops	0.88	1.55	1.41	2.44	5.74	7.14	6.75	2.93	0.02	0.91	0.59	1.14	31.49
Alfalfa Hay and Clover	0.89	2.46	3.84	4.95	6.56	6.72	6.21	5.41	4.76	2.38	0.93	1.43	46.54
Pasture and Misc. Grasses	0.88	1.86	2.86	5.01	7.04	7.13	6.90	6.07	5.14	3.51	1.11	1.14	48.64
Small Vegetables	0.88	1.96	3.77	4.35	4.48	7.54	2.90	0.77	0.02	0.91	0.59	1.14	29.31
Tomatoes and Peppers	0.88	1.05	1.63	3.13	7.12	7.79	7.44	3.36	0.02	0.91	0.59	1.14	35.04
Potatoes, Sugar beets, Turnip etc	0.88	<i>L</i> 6'0	1.14	1.71	2.39	4.43	6.78	6.81	5.98	3.87	1.27	1.35	37.59
Melons, Squash, and Cucumbers	0.88	1.58	1.40	3.10	7.06	7.39	3.52	0.76	0.02	0.91	0.59	1.14	28.34
Onions and Garlic	0.89	2.38	3.70	5.32	6.40	1.88	0.18	0.77	0.02	0.91	1.09	1.25	24.79
Citrus (no ground cover)	0.86	2.38	3.43	4.87	5.74	5.56	5.01	4.90	3.70	3.07	0.98	1.45	41.94
Immature Citrus	0.87	1.68	2.22	3.11	3.81	3.12	2.94	3.03	2.01	2.08	0.73	1.30	26.90
Avocado	0.85	66'0	1.81	2.83	5.38	6.72	6.29	5.47	4.84	3.24	10.1	1.13	40.57
Grape with 40% cover	0.84	66'0	1.49	2.66	3.75	3.23	2.74	2.48	1.03	0.92	0.55	1.13	21.82
Grape with cover crop	0.86	1.79	2.36	3.51	4.66	4.13	3.70	3.39	2.11	2.00	0.73	1.32	30.56
Grape with 60% cover	0.84	66'0	1.49	3.09	4.95	4.56	4.02	3.25	1.43	0.93	0.55	1.13	27.23
Idle	0.89	0.96	1.10	1.35	1.22	0.44	0.18	0.77	0.02	0.91	0.61	1.15	9.59

Year
Typical
Zone 9
Table 6.
ETc

Zone 9 Monthly Evapotranspiration

Surface Irrigation Typical Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include ad justments for h are spots and red uced vigor

Precipitation	5.64	0.49	0.25	1.00	0.02	0.03	0.02
Grass Reference ETo	1.53	2.86	4.54	5.51	6.58	5.58	6.56
Apple, Pear, Cherry, Plum and Prune	1.73	0.65	0.75	2.25	3.03	4.10	5.67
Apples, Plums, Cherries etc w/covercrop	1.92	3.02	3.89	5.12	5.91	5.68	7.16
Peach, Nectarine and Apricots	1.73	0.65	0.75	2.30	3.72	4.77	5.53
Immature Peaches, Nectarines, etc	1.72	0.65	0.52	1.72	1.83	2.31	2.89
Walnuts	1.73	0.65	0.29	2.00	2.67	4.37	6.28
Misc. Deciduous	1.73	0.65	1.18	2.64	4.05	4.76	5.20
Grain and Grain Hay	1.83	3.20	5.13	6.14	3.55	0.05	0.02
Safflower and Sunflower	1.69	0.97	1.74	5.42	7.28	5.92	2.02
Corn and Grain Sorghum	1.69	0.66	1.41	36.I	1.61	4.69	7.23
Misc. field crops	1.69	1.32	0.77	2.36	5.05	5.29	6.15
Alfalfa Hay and Clover	1.86	2.95	4.15	5.39	5.98	5.29	5.83
Pasture and Misc. Grasses	1.69	1.77	2.64	5.17	6.20	5.28	6.21
Small Vegetables	1.78	2.02	4.61	4.17	4.07	5.70	2.77
Tomatoes and Peppers	1.75	1.07	1.08	3.30	6.50	5.99	6.71
Potatoes, Sugar beets, Turnip etc	1.70	0.66	0.88	1.50	1.20	3.12	6.33
Melons, Squash, and Cucumbers	1.69	1.31	0.63	3.36	6.55	5.53	2.97
Onions and Garlic	1.82	2.74	4.32	5.43	5.41	1.17	0.02
Citrus (no ground cover)	1.92	2.71	3.34	4.55	4.10	3.09	4.05
Immature Citrus	1.86	1.60	1.61	2.80	2.02	1.62	1.84
Avocado	1.73	0.65	1.18	2.64	4.05	4.76	5.20
Idle	1.68	0.66	0.29	1.03	0.04	0.03	0.02

Amnual

July | August | September | October | November | December

1997 (Typical Year)

inches

inches 4.11 2.35

inches

inches 0.52 4.16

inches

inches 0.0 6.66

inches

June inches

May inches

April inches

inches

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January February March

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1.31

3.44 3.94 3.45

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1.29 2.04 2.06 1.36

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1.74

1.85

1.56

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3.16

ETc Table 7. Zone 10 Typical Year

ETc Table for Irrigation Scheduling and Design Zone 10 Monthly Evapotranspiration

Surface Irrigation Typical Year

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California Polytechnic State University, San Luis Obispo	•	1997 (Typical Year)
ESEARCH CENTER, (re spots and reduced vigor	
RIGATION TRAINING AND R	b le does not include ad justments for b ar	

	January	February	March	April	May	June	July	August	Sep temb er	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	5.68	0.12	0.54	0.14	0.17	0.06	0.84	0.56	0.06	0.81	3.14	4.51	16.63
Grass Reference ETo	1.45	2.70	4.08	5.49	6.68	6.29	6.50	6.23	5.27	4.09	2.00	1.69	52.47
Apple, Pear, Cherry, Plum and Prune	1.65	0.47	16.0	2.43	5.71	5.76	6.60	6.07	4.62	2.90	1.17	1.66	39.96
Apples, Plums, Cherries etc w/covercrop	1.67	2.70	3.57	4.75	6.99	7.15	7.36	6.92	5.91	4.04	1.94	1.99	54.99
Peach, Nectanne and Apricots	1.65	0.47	16.0	2.21	5.46	5.89	6.42	6.15	4.67	2.79	1.17	1.66	39.45
Immature Peaches, Nectarines, etc	1.66	0.47	0.70	1.20	3.34	3.67	4.03	3.90	2.77	2.16	1.18	1.67	26.75
Almonds	1.65	0.47	1.13	2.93	5.87	5.41	6.38	5.90	4.42	2.80	1.17	1.66	39.81
Almonds w/covercrop	1.67	2.28	2.85	4.71	6.84	6.62	6.71	6.59	5.39	3.40	1.59	1.95	50.59
Immature Almonds	1.66	0.47	16.0	1.87	4.38	3.98	4.60	4.44	3.24	1.83	1.17	1.67	30.22
Walnuts	1.65	0.47	1.06	1.79	5.27	6.85	6.93	6.89	5.28	3.26	1.22	1.66	42.33
Pistachio	1.65	0.47	0.49	1.15	2.37	4.72	6.90	6.63	5.22	3.30	1.22	1.66	35.77
Pistachio w/ covercrop	1.67	2.28	2.72	3.67	4.97	6.23	7.19	7.11	5.91	4.33	1.90	1.96	49.94
Immature Pistachio	1.66	0.47	0.49	0.67	1.38	3.27	4.85	4.82	3.66	2.31	1.28	1.67	26.52
Mise. Deciduous	1.65	0.47	16.0	2.34	5.39	5.70	6.26	5.71	4.60	2.62	1.17	1.66	38.48
Grain and Grain Hay	1.72	2.58	4.48	5.99	3.59	0.11	0.75	0.53	0.11	0.78	1.22	1.78	23.63
Rice	1.70	0.46	0.49	0.58	6.45	7.54	7.94	7.56	2.98	0.79	1.21	1.69	39.37
Cotton	1.70	0.46	0.49	0.87	1.33	3.71	6.84	6.78	5.24	2.07	1.20	1.69	32.38
Safflower and Sunflower	1.70	0.76	1.73	5.29	7.65	6.57	2.07	0.54	0.11	0.78	1.21	1.69	30.09
Corn and Grain Sorghum	1.70	0.46	1.64	1.39	2.31	5.64	6.73	5.03	0.59	0.78	1.21	1.69	29.16
Misc. field crops	1.70	0.46	1.64	1.40	2.37	5.88	6.31	2.80	0.11	0.78	1.21	1.69	26.32
Alfalfa Hay and Clover	1.72	5.69	3.90	5.15	6.18	5.87	5.89	2.68	4.75	2.57	1.82	1.98	48.20
Pasture and Misc. Grasses	1.70	1.09	2.24	4.57	6.47	6.23	6.60	6.31	5.11	3.56	1.65	1.69	47.21
Small Vegetables	1.71	1.26	3.89	5.75	1.75	0.09	0.75	1.57	1.46	1.94	1.77	1.96	23.90
Tomatoes and Peppers	1.70	0.46	1.25	0.89	3.48	6.66	6.38	1.63	0.11	0.78	1.21	1.69	26.22
Potatoes, Sugar beets, Turnips etc.	1.70	98.0	2.28	5.79	7.47	6.93	6.61	99'0	0.11	0.78	1.21	1.69	36.08
Melons, Squash, and Cucumbers	1.70	0.46	0.49	0.19	0.92	1.04	4.06	5.14	1.76	0.78	1.21	1.69	19.42
Onions and Garlic	1.72	2.27	3.57	4.93	4.73	0.85	0.75	0.53	0.11	0.78	1.87	1.78	23.90
Citrus (no ground cover)	1.67	2.42	3.11	4.23	4.71	4.31	5.05	4.77	3.74	3.49	1.92	1.98	41.40
Immature Citrus	1.68	1.37	1.78	2.55	2.92	2.60	3.29	3.06	2.21	2.50	1.62	1.85	27.44
Avocado	1.65	6.47	16'0	2.34	5.39	5.70	6.26	5.71	4.60	2.62	1.17	1.66	38.48
Idle	1.72	0.45	0.49	0.19	0.16	0.09	0.75	0.53	0.11	0.78	1.22	1.69	8.18

ETc Table 8. Zone 12 Typical Year

ETc Table for Irrigation Scheduling and Design Zone 12 Monthly Evapotranspiration

Surface Irrigation Typical Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare spots and reduced vigor

1997 (Typical Year)

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	January	February	March	April	May	June	July	August	Septemb er	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	6.81	0.27	1.34	0.22	0.21	0.20	0.13	0.34	0.07	0.64	4.15	2.12	16.50
Grass Reference ETo	0.73	2.12	4.01	5.56	7.32	7.58	7.98	6.76	5.39	3.47	1.05	0.99	52.96
Apple, Pear, Cherry, Plum and Prune	0.84	0.92	1.56	2.37	6.29	7.08	7.65	6.47	4.85	2.25	0.45	0.95	41.68
Apples, Plums, Cherries etc w/covercrop	0.84	2.37	4.09	4.72	7.60	8.94	9.22	7.64	5.97	3.44	0.85	1.19	56.88
Peach, Nectarine and Apricots	0.84	0.92	1.58	2.17	6.11	7.08	7.54	6.45	4.76	2.37	0.46	0.95	41.21
Immature Peaches, Nectarines, etc	0.84	0.92	1.34	1.19	3.84	4.28	4.65	4.10	2.86	1.67	0.46	0.95	27.11
Almonds	0.84	0.98	1.82	2.97	6.51	6.81	7.21	6.29	4.71	2.95	0.54	0.95	42.59
Almonds w/covercrop	0.84	2.13	3.51	4.68	7.52	8.16	8.33	7.24	5.37	3.42	0.79	1.17	53.17
Immature Almonds	0.84	0.96	1.56	2.02	4.68	5.11	5.10	4.69	3.33	2.41	0.49	0.95	32.14
Walnuts	0.83	0.92	1.71	1.78	5.76	8.48	8.72	7.36	5.24	2.87	0.57	0.95	45.18
Pistachio	0.84	0.92	1.11	1.14	2.62	6.00	8.27	7.09	5.34	2.73	0.53	0.95	37.53
Pistachio w/ covercrop	0.84	2.14	3.46	3.70	5.53	7.50	9.11	U 7.7	6.05	3.51	0.99	1.17	51.79
Immature Pistachio	0.84	0.92	1.11	0.69	1.54	3.95	5.75	4.95	3.71	2.02	0.52	0.95	26.94
Misc. Deciduous	0.84	0.92	1.56	2.28	5.94	6.84	7.27	6.28	4.56	2.39	0.45	0.95	40.29
Grain and Grain Hay	0.87	2.25	4.42	6.13	3.86	0.22	0.15	0.34	0.07	0.63	0.49	1.03	20.46
Rice	0.86	0.91	1.11	0.75	7.13	9.19	9.74	8.22	2.53	0.63	0.49	0.95	42.49
Cotton	0.86	0.91	1.10	1.00	1.71	4.68	4.8	7.40	5.19	1.63	0.49	0.95	34.37
Safflower and Sunflower	98.0	1.17	2.34	5.21	8.41	7.19	0.94	0.34	0.07	59.0	0.49	0.95	28.61
Corn and Grain Sorghum	08.0	0.91	2.15	1.39	2.57	6.97	8.13	5.51	0.49	0.63	0.49	0.95	31.04
Misc. field crops	0.86	0.91	2.15	1.39	2.55	7.12	7.74	2.92	0.07	0.63	0.49	0.95	27.77
Alfalfa Hay and Clover	0.86	2.25	4.23	5.16	6.68	7.02	7.19	5.97	4.91	2.15	0.87	1.17	48.46
Pasture and Misc. Grasses	08.0	1.43	2.84	4.61	7.25	7.53	7.87	6.67	5.33	3.07	0.80	0.95	49.20
Small Vegetables	-2.0	1.55	3.92	5.95	1.91	0.21	0.15	1.44	1.54	1.59	0.76	1.15	21.04
Tomatoes and Peppers	0.86	0.91	1.66	0.78	3.77	8.10	7.01	16.0	0.07	0.63	0.49	0.95	26.14
Potatoes, Sugar beets, Turnips etc.	0.86	1.21	2.74	5.88	8.15	8.45	UK. 7	4.0	0.07	0.63	0.49	0.95	37.57
Melons, Squash, and Cucumbers	0.86	0.91	1.10	0.22	1.00	1.48	5.06	5.61	1.58	0.63	0.49	0.95	19.89
Onions and Garlic	0.87	2.08	3.83	5.00	5.46	1.15	0.18	0.34	0.07	0.63	1.03	1.03	21.67
Citrus (no ground cover)	0.84	2.22	3.73	4.24	5.23	5.36	5.62	4.98	3.69	2.87	0.85	1.18	40.80
Immature Citrus	0.85	1.56	2.38	2.52	3.39	3.24	3.36	3.28	2.40	1.82	0.67	1.09	26.55
Avocado	0.84	0.92	1.56	2.28	5.94	6.84	7.27	6.28	4.56	2.39	0.45	0.95	40.29
Grape Vines with 80% canopy	0.84	0.92	1.27	1.14	3.52	5.90	6.38	4.91	3.12	0.63	0.46	0.95	30.05
Grape Vines with cover crop (80% canopy)	0.85	1.96	3.10	3.08	5.38	6.88	7.15	5.80	3.60	2.35	0.74	1.15	42.04
Immature Grapes Vines with 50% canopy	0.85	0.91	1.21	0.82	2.42	4.30	4.46	3.73	1.87	0.63	0.47	0.95	22.63
Idle	0.87	0.90	1.11	0.22	0.22	0.21	0.15	0.34	0.07	0.63	0.50	0.96	6.18

Year
Typical
Zone 13
Fc Table 9.
EI

Zone 13 Monthly Evapotranspiration

Polytechnic State University, San Luis Obispo .; 155 ζ F

Surface Irrigation Typical Year more survey and survey succession and survey succession of the
LKRIGA LIUN I KALIVLING ANU KENEAKCH CENIEK, California Folyt Table does not include adjustments for bare gots and reduced vgor

						19	97 (Typi	cal Year)					
	January	February	March	April	May	June	July	August	September	October	November	December .	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	11.46	0.79	0.37	1.10	0.33	0.43	0.12	0.28	0.08	1.56	2.22	2.46	21.20
Grass Reference ETo	0.89	1.95	4.01	4.80	6.98	6.74	8.27	7.59	5.79	3.59	1.38	1.05	53.03
Apple, Pear, Cherry, Plum and Prune	1.02	1.33	0.76	1.90	3.51	5.91	7.90	7.31	5.39	3.41	0.86	1.07	40.37
Apples, Plums, Cherries etc w/covercrop	1.05	2.36	3.65	4.24	6.93	7.66	9.64	96'8	6.71	3.88	1.38	1.27	57.73
Almonds	1.02	1.33	0.76	1.85	3.16	5.32	7.33	7.09	5.31	3.48	1.24	1.07	38.96
Almonds w/covercrop	1.05	2.24	2.88	3.73	5.78	6.87	8.67	8.17	6.07	3.87	1.39	1.26	51.96
Immature Almonds	1.02	1.33	0.64	1.58	2.49	3.89	5.35	4.99	3.80	2.60	1.04	1.07	29.79
Walnuts	1.01	1.33	0.62	2.01	3.08	5.49	8.84	8.26	5.93	3.60	1.17	1.07	42.42
Pistachio	1.02	1.33	0.40	1.86	2.43	4.93	8.46	8.26	6.27	3.53	1.29	1.07	40.86
Pistachio w/ covercrop	1.05	2.24	2.86	3.86	5.40	6.76	9.35	8.99	6.77	4.16	1.42	1.26	54.11
Immature Pistachio	1.02	1.33	0.40	1.47	1.44	3.60	5.60	5.71	4.31	2.70	1.03	1.07	29.67
Misc. Deciduous	1.02	1.33	0.40	1.66	2.20	4.74	7.64	7.34	5.40	3:55	0.82	1.07	37.17
Grain and Grain Hay	1.05	2.22	4.43	5.33	3.98	0.45	0.11	0.28	0.08	1.08	0.73	1.12	20.86
Rice	1.03	1.32	0.40	1.48	6.84	8.21	10.25	9.35	2.66	1.08	0.73	1.07	44.42
Cotton	1.03	1.31	1.05	1.37	1.76	5.73	8.87	7.70	1.37	1.10	0.73	1.07	33.06
Corn and Grain Sorghum	1.03	1.31	1.22	2.21	2.72	6.85	8.94	7.37	0.93	1.08	0.73	1.07	35.45
Misc. field crops	1.03	1.31	1.22	2.21	2.62	6.49	8.10	3.17	0.08	1.08	0.73	1.07	29.11
Alfalfa Hay and Clover	1.06	2.22	4.00	4.38	6.38	6.79	7.49	6.70	5.22	2.58	1.20	1.25	49.27
Pasture and Misc. Grasses	1.03	1.75	2.33	4.25	7.01	6.80	8.31	7.63	5.73	3.29	1.15	1.07	50.35
Small Vegetables	1.05	1.80	3.74	2.27	0.35	0.44	0.11	1.43	1.59	2.06	1.24	1.21	17.28
Tomatoes and Peppers	1.03	1.31	1.15	1.61	3.67	7.24	7.69	1.12	0.08	1.08	0.73	1.07	27.77
Misc Subtropical	1.02	1.33	0.40	1.66	2.20	4.74	7.64	7.34	5.40	3.55	0.82	1.07	37.17
Grape Vines with 80% canopy	1.02	1.33	0.76	2.03	4.02	5.38	6.06	5.67	2.79	1.09	0.71	1.07	31.93
Grape Vines with cover crop (80% canopy)	1.05	2.12	2.46	3.20	5.64	5.93	7.00	6.60	3.58	2.71	1.04	1.25	42.58
Immature Grapes Vines with 50% canopy	1.02	1.32	0.64	1.67	3.06	4.17	4.74	3.93	2.18	1.09	0.72	1.07	25.62
Idle	1.03	1.31	0.40	1.06	0.35	0.44	0.11	0.28	0.08	1.08	0.74	1.06	7.95

ETc Table 10. Zone 14 Typical Year

ETc Table for Irrigation Scheduling and Design Zone 14 Monthly Evapotranspiration

Surface Irrigation Typical Y ear IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjuctments for bare gots and reduced vgor

	January	February	March	April	May	June	July	August	S eptemb er	October 0	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
u	8.22	0.28	0.81	0.30	0.44	0.35	0.09	0.31	0.31	0.82	4.92	2.74	19.59
rence ETo	0.73	2.36	4.13	5.82	7.62	8.00	8.36	7.11	5.82	3.86	1.25	1.14	56.22
r, Cherry, Plum and Prune	0.86	0.92	1.22	2.58	6.85	7.83	8.18	6.94	5.45	2.96	0.60	1.06	45.45
ms, Chernes etc w/covercrop	0.88	2.56	3.87	4.91	8.21	9.50	9.78	8.29	99'9	4.10	1.09	1.42	61.27
tarine and Apricots	0.86	0.92	1.24	2.37	6.68	7.93	7.99	7.00	5.47	2.74	0.61	1.06	44.86
eaches, Nectarines, etc	0.86	0.93	1.00	1.34	4.24	5.04	5.11	4.55	3.41	1.88	0.61	1.06	30.03
	0.86	0.92	1.45	3.16	7.03	7.72	7.72	6.63	5.21	2.85	09.0	1.06	45.19
'covercrop	0.88	2.26	3.31	4.84	8.06	8.90	9.03	7.75	5.96	3.53	1.01	1.37	56.91
Imonds	0.86	0.93	1.20	2.29	5.23	5.70	5.82	5.09	3.79	2.06	0.61	1.06	34.62
	0.86	0.92	1.38	1.94	6.30	9.13	9.35	8.05	5.98	3.22	0.71	1.06	48.91
	0.86	0.92	0.76	1.27	2.97	6.53	8.93	7.49	5.89	3.20	0.66	1.06	40.52
/ covercrop	0.88	2.26	3.13	3.99	5.90	8.22	9.65	8.28	6.76	4.14	1.15	1.37	55.75
istachio	0.86	0.93	0.76	0.79	1.87	4.43	6.19	5.31	4.22	2.43	0.66	1.06	29.49
luous	0.86	0.92	1.22	2.49	6.54	7.40	7.77	6.76	1 6°5	2.66	09.0	1.06	43.71
brain Hay	0.88	2.52	4.55	6.43	4.14	0.38	0.10	0.33	0.31	0.81	0.64	1.15	22.24
	0.86	0.92	0.76	0.89	7.49	9.76	10.35	8.76	3.23	0.81	0.64	1.06	45.52
	0.86	0.92	0.76	1.09	1.98	5.19	8.91	7.77	56'5	2.26	0.64	1.05	37.38
ad Sunflower	0.88	1.22	2.17	5.52	8.80	8.21	1.28	0.33	0.31	0.81	0.64	1.06	31.21
rain Sorghum	0.86	0.92	1.75	1.60	2.84	7.55	8.66	6.18	0.83	0.81	0.64	1.05	33.70
rops	0.86	0.92	1.75	1.60	2.87	7.63	8.26	3.00	0.31	0.81	0.64	1.05	29.71
and Clover	0.88	2.50	4.29	5.23	6.99	7.52	7.51	6.29	5.37	<u>4</u>	1.07	1.35	51.44
. Misc. Grasses	0.86	1.54	2.69	4.89	7.59	8.09	8.36	7.25	5.75	3.28	0.92	1.06	52.27
tables	0.88	1.65	4.09	6.28	2.29	0.36	0.10	1.45	1.91	1.75	1.00	1.33	23.07
ind Peppers	0.86	0.92	1.50	1.11	4.05	8.73	7.24	08.0	0.31	0.81	0.64	1.05	28.03
ugar beets, Turnips etc.	0.86	1.27	2.69	6.19	8.55	8.89	7.75	0.40	0.31	0.81	0.64	1.05	39.41
uash, and Cucumbers	0.86	0.92	0.76	0.31	1.23	1.66	5.33	5.98	1.92	0.81	0.64	1.05	21.47
Garlic	0.88	2.30	3.78	5.33	5.29	1.00	0.11	0.33	0.31	0.81	1.25	1.15	22.52
ground cover)	0.88	2.36	3.56	4.55	5.81	6.09	6.08	5.33	4.33	3.46	1.12	1.40	44.98
itrus	0.88	1.60	2.23	2.83	3.61	3.90	3.73	3.51	2.78	2.54	0.88	1.24	29.73
	0.86	0.92	1.22	2.49	6.54	7.40	7.77	6.76	5.34	2.66	09.0	1.06	43.71
s with 80% canopy	0.86	0.93	0.94	1.28	3.83	6.58	6.78	5.38	3.27	0.83	0.61	1.06	32.34
s with cover crop (80% canopy)	0.88	2.04	2.92	3.20	5.89	7.49	7.53	6.28	4.06	2.41	0.80	1.33	44.82
trapes Vines with 50% canopy	0.86	0.93	0.88	0.94	2.89	4.90	4.74	4.13	2.25	0.83	0.61	1.05	25.01
	0.86	0.92	0.76	0.31	0.44	0.36	0.10	0.33	0.31	0.81	0.65	1.05	6.90

1997 (Typical Year)

ETc Table 11. Zone 15 Typical Year

ETc Table for Irrigation Scheduling and Design Zone 15 Monthly Evapotranspiration

Surface Irrigation Typical Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare gots and reduced vgor

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	3.46	0.39	0.07	0.59	0.01	0.33	0.01	0.00	0.02	0.33	16.1	1.28	8.40
Grass Reference ETo	0.95	2.30	4.38	6.30	8.18	8.18	8.35	7.33	5.72	4.04	1.58	1.09	58.41
Apple, Pear, Cherry, Plum and Prune	1.05	0.95	0.86	3.84	7.26	7.90	7.70	6.50	5.19	2.29	0.82	1.10	45.45
Apples, Plums, Chernes etc w/covercrop	1.05	2.58	3.79	5.38	8.77	9.40	9.38	8.20	6.08	3.83	1.36	1.21	61.02
Peach, Nectarine and Apricots	1.05	0.95	0.65	2.89	6.82	7.84	7.83	6.67	4.80	2.77	0.82	1.10	44.19
Immature Peaches, Nectarines, etc	1.06	0.94	0.38	1.77	4.25	5.29	5.10	4.47	3.21	1.41	0.83	1.11	29.83
Almonds	1.05	1.15	1.30	4.41	6.78	7.00	7.32	6.00	4.45	2.03	0.82	1.10	43.42
Almonds w/covercrop	1.02	2.34	2.57	5.85	8.24	8.17	16.7	6.96	5.06	2.84	1.20	1.16	53.33
Immature Almonds	1.06	1.08	0.82	3.68	5.81	6.04	5.96	5.05	3.60	1.68	0.83	1.11	36.70
Walnuts	1.04	0.95	0.99	2.98	7.74	9.29	9.41	8.11	5.79	2.77	1.03	1.10	51.20
Pistachio	1.05	0.95	0.12	1.69	2.75	6.59	8.95	7.75	5.73	3.10	0.87	1.10	40.65
Pistachio w/ covercrop	1.05	2.33	2.67	4.75	5.93	8.55	9.64	8.50	6.53	3.98	1.44	1.22	56.57
Immature Pistachio	1.06	0.94	0.12	1.15	1.53	4.54	6.24	5.42	3.95	2.02	0.93	1.11	29.01
Misc. Deciduous	1.05	0.95	0.85	3.38	7.22	7.51	7.27	6.56	2 8.4	2.50	0.82	1.10	44.05
Grain and Grain Hay	1.12	2.42	4.81	7.00	4.01	0.40	0.01	0.00	0.02	0.33	0.89	1.20	22.21
Rice	1.11	0.93	0.12	1.31	7.97	9.98	10.40	9.06	2.78	0.33	0.86	1.15	45.98
Cotton	1.11	0.92	0.12	1.39	1.68	5.26	8.92	8.10	5.74	1.57	0.86	1.14	36.81
Safflower and Sunflower	1.11	1.19	1.78	6.22	9.58	8.20	1.22	0.00	0.02	0.33	0.86	1.15	31.66
Corn and Grain Sorghum	1.11	0.92	1.20	1.83	2.84	7.68	8.83	5.96	0.46	0.33	0.86	1.14	33.17
Misc. field crops	1.11	0.92	1.20	1.84	2.82	7.94	8.15	2.76	0.02	0.33	0.86	1.14	29.10
Alfalfa Hay and Clover	1.11	2.45	4.32	6.19	7.55	7.86	7.53	6.57	5.13	2.10	1.40	1.27	53.48
Pasture and Misc. Grasses	1.11	1.47	2.23	5.43	8.14	8.32	8.34	7.34	5.65	3.53	1.30	1.15	54.01
Small Vegetables	1.12	1.57	4.19	6.83	1.88	0.39	0.01	1.11	1.52	1.34	1.39	1.26	22.61
Tomatoes and Peppers	1.11	0.92	0.88	1.45	4.53	8.80	7.36	0.59	0.02	0.33	0.86	1.14	27.99
Potatoes, Sugar beets, Turmps etc.	1.11	1.26	2.50	6.82	9.22	9.29	7.84	0.09	0.02	0.33	0.86	1.14	40.49
Melons, Squash, and Cucumbers	1.11	0.92	0.12	0.61	0.74	1.57	5.36	6.08	1.79	0.33	0.86	1.14	20.64
Onions and Garlic	1.12	2.22	3.88	5.83	5.35	0.83	0.01	0.00	0.02	0.33	1.55	1.20	22.33
Citrus (no ground cover)	1.05	2.42	3.14	5.20	5.89	6.28	5.98	5.40	4.27	3.13	1.46	1.22	45.44
Immature Citrus	1.07	1.66	1.59	3.39	3.57	4.11	3.76	3.46	2.57	2.05	1.20	1.20	29.63
Misc Subtropical	1.05	0.95	0.85	3.38	7.22	7.51	7.27	6.56	4.84	2.50	0.82	1.10	44.05
Grape Vines with 80% canopy	1.06	0.94	0.52	1.94	4.52	6.46	6.35	5.06	2.58	0.51	0.83	1.11	31.89
Grape Vines with cover crop (80% canopy)	1.07	2.09	2.59	3.71	6.23	7.31	7.25	5.57	3.92	2.40	1.23	1.23	44.59
Immature Grapes Vines with 50% canopy	1.08	0.94	0.39	1.44	3.43	4.90	4.89	3.76	2.14	0.42	0.84	1.12	25.33
Idle	1.13	0.92	0.12	0.61	0.01	0.39	0.01	0.00	0.02	0.33	0.87	1.16	5.57

1997 (Typical Year)

ETc Table 12. Zone 16 Typical Year

ETc Table for Irrigation Scheduling and Design Zone 16 Monthly Evapotranspiration

Surface Irrigation Typical Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare spots and reduced vigor

1997 (Typical Year)

	January	February	March	April	May	June	ylub	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	2.85	0.15	2.22	0.00	0.02	0.13	0.20	0.08	0.09	0.52	1.36	1.56	9.19
Grass Reference E To	0.82	2.22	4.50	6.73	8.52	8.23	8.34	7.62	5.80	4.20	1.58	0.84	59.41
Apple, Pear, Cherry, Flum and Prune	0.90	0.72	2.69	3.49	7.76	7.85	7.72	6.93	4.79	2.98	0.81	0.90	47.55
Apples, Plums, Cherries etc w/covercrop	06.0	2.31	4.67	5.99	9.04	9.43	9.28	8.47	6.18	3.99	1.49	0.93	62.68
Peach, Nectarine and Apricots	0.90	0.72	2.46	2.50	7.12	7.86	7.82	7.13	5.10	2.66	0.81	0.90	45.97
Immature Peaches, Nectannes, etc	0.92	0.72	2.27	1.35	4.47	5.21	5.32	4.56	3.25	1.92	0.82	0.91	31.71
Almonds	06'0	26.0	2.94	4.25	7.33	6.95	7.15	Q.61	4.26	2.44	0.81	0.90	45.47
Almonds w/covercrop	0.89	2.12	4.18	5.80	8.08	8.22	8.34	7.49	5.11	3.21	1.25	0.90	55.60
Immature Almonds	0.92	0.85	2.61	3.60	6.05	5.89	6.01	5.43	3.69	1.85	0.82	0.91	38.64
Wahnts	0.89	0.72	2.82	2.69	8.17	9.24	9.43	8.53	5.70	3.17	0.91	06:0	53.17
Pistachio	0.90	0.72	2.09	1.23	3.01	6.42	8.88	8.31	5.72	3.25	0.88	0.90	42.31
Pistachio w/ covercrop	0.90	2.04	3.76	4.60	6.17	8.33	9.62	8.94	6.65	4.19	1.37	0.93	57.51
Immature Pistachio	0.92	0.72	2.08	0.65	1.68	4.44	6.21	5.73	4.12	2.09	0.92	0.91	30.47
Mise. Deciduous	0.90	0.72	2.69	3.47	7.23	7.35	7.42	6.55	5.19	2.40	0.81	0.90	45.63
Grain and Grain Hay	0.97	2.27	5.07	7.46	4.17	0.15	0.22	0.09	0.09	0.42	0.91	0.97	22.80
Cotton	0.96	0.70	2.04	0.82	1.76	5.09	8.89	8.37	5.81	1.65	0.84	0.95	37.88
Safflower and Sunflower	0.96	0.95	3.02	6.61	9.97	8.88	1.79	0.09	0.09	0.42	0.85	0.95	34.59
Com and Grain Sorghum	0.96	0.70	3.15	1.26	3.07	7.61	8.76	5.56	0.41	0.42	0.84	0.95	33.69
Misc. field crops	0.96	0.70	3.15	1.26	3.01	7.96	8.22	3.30	0.09	0.42	0.84	0.95	30.85
Alfalfa Hay and Clover	0.96	2.31	4.69	6.28	7.88	7.63	7.62	6.89	5.22	2.18	1.44	0.99	54.08
Pasture and Misc. Grasses	0.96	1.78	3.66	5.62	8.51	8.31	8.41	1972	5.78	3.53	1.28	0.95	56.41
Small Vegetables	0.97	1.37	4.53	7.28	1.95	0.14	0.22	1.20	1.67	1.39	1.41	0.99	23.10
Tomatoes and Peppers	0.96	0.70	2.81	0.75	4.78	8.83	8.07	0.85	0.09	0.42	0.84	0.95	30.05
Potatoes, Sugar beets, Turnips etc.	0.96	1.02	3.40	7.30	9.63	9.35	8.13	0.21	0.09	0.42	0.84	0.95	42.32
Melons, Squash, and Cucumbers	0.96	0.70	2.07	0.08	0.80	1.48	5.41	6.32	1.72	0.42	0.84	0.95	21.77
Onions and Garlic	0.97	2.05	4.47	5.97	5.60	0.69	0.22	0.09	0.09	0.42	1.49	0.97	23.03
Citrus (no ground cover)	0.00	2.15	4.30	5.10	6.02	6.26	6.22	5.69	4.25	3.42	1.60	0.93	46.84
Immature Citrus	0.92	1.40	3.32	3.12	3.77	4.00	4.05	3.52	2.69	2.13	1.28	0.94	31.14
Misc Subtropical	0.00	0.72	2.69	3.47	7.23	7.35	7.42	6.55	5.19	2.40	0.81	0.90	45.63
Grape Vines with 80% canopy	0.92	0.72	2.36	1.55	4.54	6.59	6.53	5.24	2.97	0.43	0.82	0.91	33.58
Grape Vines with cover crop (80% canopy)	0.91	1.78	4.01	3.80	6.16	7.13	7.48	6.19	3.66	1.93	1.04	0.88	44.97
Immature Grapes Vines with 50% canopy	0.93	0.71	2.27	1.00	3.66	4.85	5.11	3.82	2.11	0.42	0.83	0.92	26.62
Idle	0.99	0.69	2.06	0.09	0.02	0.14	0.22	0.09	0.09	0.42	0.85	0.97	6.63

ETc Table 13. Zone 18 Typical Year

ETc Table for Irrigation Scheduling and Design

Zone 18 Monthly Evapotranspiration Surface Irrigation Typical Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo

Table does not include adjustments for hare spots and reduced vigor

1998 (Typical Year)

	January	February	March	April	May	June	July	August	September	October	November	December
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	0.18	1.31	<i>LE</i> .0	0.05	0.08	0.06	0.04	0.07	0.12	0.04	0.05	0.28
Grass Reference ETo	2.27	2.63	5.02	7.20	8.36	9.40	9.12	8.35	6.93	5.39	2.90	2.63
Peach, Nectanine and Apricots	0.22	1.21	2.83	3.72	7.66	10.14	9.63	8.74	7.32	5.34	0.28	0.28
Grain and Grain Hay	1.26	2.85	5.78	6.70	0.69	0.06	0.04	0.07	0.12	0.04	0.99	1.46
Cotton	0.21	1.21	1.25	1.41	2.36	8.23	10.54	9.73	7.23	1.49	0.05	0.26
Safflower and Sunflower	0.96	1.61	2.18	7.29	16'6	9.58	1.14	0.07	0.12	0.04	0.04	0.26
Corn and Grain Sorghum	1.11	1.92	4.61	8.71	9.47	2.57	0.05	0.07	0.12	0.04	0.04	1.30
Misc. field crops	1.08	1.99	4.57	7.70	4.98	0.08	0.04	0.07	0.12	0.04	0.04	1.49
Alfalfa Hay and Clover	2.36	2.78	5.06	7.39	7.38	8.78	8.28	7.60	6.68	5.30	2.32	2.92
Pasture and Misc. Grasses	0.22	2.43	2.21	4.82	7.54	9.02	8.62	8.00	6.00	2.55	0.06	0.26
Small Vegetables	1.95	2.35	5.10	2.52	0.10	0.06	0.04	0.07	1.88	1.81	1.35	2.75
Tomatoes and Peppers	1.07	1.66	3.42	8.56	9.78	4.09	0.04	0.07	0.12	0.04	0.04	0.26
Potatoes, Sugar beets, Turnips etc.	2.74	3.28	6.20	8.89	8.45	0.22	0.04	0.07	1.08	0.34	0.53	2.08
Melons, Squash, and Cucumbers	1.07	1.66	3.24	7.85	9.07	4.24	0.05	0.07	0.12	0.04	0.04	0.26
Onions and Garlic	2.42	2.88	5.32	6.69	1.85	0.07	0.04	0.07	1.08	0.36	0.93	2.47
Citrus (no ground cover)	2.03	2.80	4.05	5.29	6.60	7.42	7.10	6.50	5.50	4.20	2.28	2.53
Grape Vines with 80% canopy	0.22	1.21	2.83	3.72	2.66	10.14	9.63	8.74	7.32	5.34	0.28	0.28
Idle	0.21	1.21	0.44	0.10	80'0	0.06	0.04	0.07	0.12	0.04	0.04	0.26

inches Annual

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Zone 1 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include ad justments for h are spots and red uced vigor

Precipitation	8.11	13.07	3.50	2.32	1.54	0.16	
Grass Reference ETo	0.87	1.06	2.61	4.07	4.70	4.23	
Apple, Pear, Cherry, Plum and Prune	0.90	1.10	2.32	2.98	3.62	3.28	
Apples, Plums, Cherries etc w/covercrop	0.91	1.13	2.84	4.28	5.07	4.30	
Peach, Nectarine and Apricots	0.90	1.10	2.32	3.01	4.01	3.58	
Immature Peaches, Nectarines, etc	0.92	1.13	2.29	2.64	2.75	1.84	
Misc. Deciduous	06.0	1.10	2.51	3.24	4.24	3.44	
Grain and Grain Hay	1.00	1.23	3.01	4.52	3.16	0.23	
Corn and Grain Sorghum	0.98	1.19	2.66	2.63	2.57	3.59	
Misc. field crops	0.98	1.20	2.36	3.13	4.45	4.01	
Alfalfa Hay and Clover	1.00	1.22	3.00	4.59	5.20	4.13	
Pasture and Misc. Grasses	0.98	1.23	2.93	4.20	4.86	3.98	
Small Vegetables	0.99	1.22	2.90	3.67	3.79	4.29	
Tomatoes and Peppers	0.98	1.20	2.52	3.60	5.00	4.50	
Potatoes, Sugar beets, Turnips etc.	0.99	1.19	2.52	2.62	2.29	2.36	
Melons, Squash, and Cucumbers	0.98	1.20	2.35	3.44	4.94	4.18	
Citrus (no ground cover)	0.91	1.13	2.84	3.95	4.20	2.88	
Immature Citrus	0.93	1.15	2.72	3.14	2.75	1.37	
Avocado	0.90	1.10	2.51	3.24	4.24	3.44	
Idle	1.02	1.23	2.30	2.31	1.54	0.21	

<u>Amual</u> inches

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1998 (Wet Y ear)

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September October November December

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Year
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Zone 3 ¹
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Table
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Zone 3 Monthly Evapotranspiration Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare gots and red vigor

1998 (Wet Y ear)

	January	February	March	April	May	June	July	August	September	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	1.65	7.30	2.74	1.11	1.59	0.35	0.02	00'0	0.15	0.76	0.88	0.70	17.25
Grass Reference ETo	0.93	1.37	3.13	4.73	5.39	7.11	8.52	7.69	5.30	3.61	1.60	1.20	50.58
Apple, Pear, Cherry, Plum and Prune	1.04	1.25	2.49	3.05	3.46	3.83	4.69	4.47	3.19	2.42	1.22	0.94	32.07
Apples, Plums, Cherries etc w/covercrop	1.07	1.27	3.31	4.49	4.58	4.74	5.77	5.67	3.77	3.11	1.37	1.54	40.69
Peach, Nectarine and Apricots	1.04	1.25	2.49	3.09	3.79	4.10	4.82	4.43	3.04	2.68	1.24	0.94	32.91
Immature Peaches, Nectarines, etc	1.06	1.27	2.39	2.68	2.76	2.19	2.49	2.16	1.55	1.72	1.17	0.94	22.39
Almonds	1.04	1.25	2.49	3.39	4.07	3.93	4.70	4.06	3.22	2.29	1.29	0.94	32.67
Almonds w/covercrop	1.07	1.27	3.29	4.34	4.55	4.62	5.16	5.25	3.37	2.90	1.37	1.48	38.65
Immature Almonds	1.06	1.27	2.39	2.83	2.94	2.17	2.48	2.18	1.31	1.56	1.23	0.94	22.35
Walnuts	1.04	1.25	2.27	2.91	3.26	3.97	5.19	5.02	3.58	2.76	1.34	0.94	33.54
Misc. Deciduous	1.05	1.25	2.73	3.35	3.98	3.93	4.70	4.03	3.24	2.40	1.32	0.94	32.93
Grain and Grain Hay	1.13	1.34	3.36	4.72	3.27	0.40	0.03	0.05	0.09	1.16	1.20	1.25	18.01
Safflower and Sunflower	1.12	1.33	2.82	4.63	4.80	4.87	1.58	0.05	0.09	0.46	1.16	0.95	23.87
Com and Grain Sorghum	1.11	1.32	2.69	2.68	2.60	4.07	5.98	5.22	0.88	0.46	1.16	0.95	29.12
Misc. field crops	1.11	1.32	2.45	3.21	4.15	4.36	5.15	1.95	0.09	0.46	1.16	0.95	26.37
Alfalfa Hay and Clover	1.14	1.34	3.35	4.81	4.87	4.55	4.98	4.72	3.12	1.92	1.36	1.51	37.67
Pasture and Misc. Grasses	1.12	1.34	3.25	4.36	4.55	4.44	5.20	4.99	3.42	3.00	1.45	0.95	38.07
Small Vegetables	1.12	1.34	3.22	3.72	3.74	4.69	1.77	0.05	0.09	0.46	1.16	0.95	22.30
Tomatoes and Peppers	1.11	1.32	2.64	3.72	4.52	4.90	5.60	2.37	0.09	0.46	1.16	0.95	28.86
Potatoes, Sugar beets, Turnips etc.	1.12	1.32	2.68	2.64	2.38	2.70	5.40	5.87	3.98	3.45	1.51	1.36	34.41
Melons, Squash, and Cucumbers	1.11	1.32	2.44	3.56	4.51	4.60	2.30	0.05	0.09	0.46	1.16	0.95	22.55
Onions and Garlic	1.13	1.34	3.22	4.37	4.19	1.81	0.03	0.05	0.09	0.46	1.43	1.14	19.26
Flowers, Nursery and Christmas Tree	1.05	1.25	2.73	3.35	3.98	3.93	4.70	4.03	3.24	2.40	1.32	0.94	32.93
Citrus (no ground cover)	1.07	1.27	3.30	4.09	3.88	3.29	3.21	3.32	2.07	2.12	1.36	1.47	30.44
Immature Citrus	1.08	1.28	3.01	3.19	2.77	1.72	1.79	1.48	1.05	1.28	1.26	1.24	21.14
Avocado	1.05	1.25	2.73	3.35	3.98	3.93	4.70	4.03	3.24	2.40	1.32	0.94	32.93
Grape with 40% cover	1.06	1.26	2.51	3.25	3.15	2.23	2.04	1.55	0.80	0.47	1.11	0.94	20.37
Grape with cover crop	1.08	1.28	3.09	3.59	3.53	2.64	2.55	2.36	1.53	1.44	1.27	1.29	25.65
Grape with 60% cover	1.06	1.26	2.51	3.63	3.75	3.14	3.08	2.28	1.10	0.47	1.11	0.94	24.32
Idle	1.14	1.34	2.27	2.23	1.79	0.34	0.03	0.05	0.09	0.47	1.18	0.96	11.88

Year
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Zone 4 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Ohispo Table does not include adjustments for hare spots and red uced vigor

	inches											
Precipitation	5.87	15.74	3.31	1.44	2.46	0.06	0.04	0.07	0.22	0.46	2.28	1.31
Grass Reference ETo	1.12	1.51	3.23	4.41	4.82	5.20	6.16	60.9	4.00	3.22	1.61	1.54
Apple, Pear, Cherry, Plum and Prune	1.19	1.70	2.85	2.75	3.98	4.18	5.34	5.13	3.56	2.47	1.30	1.14
Apples, Pluns, Cherries etc w/covercrop	1.22	1.70	3.72	4.73	5.10	5.44	6.50	6.48	4.32	3.11	1.61	1.79
Peach, Nectarine and Apricots	1.19	1.70	2.85	2.79	4.30	4.55	5.34	5.24	3.36	2.81	1.30	1.14
Immature Peaches, Nectarines, etc	1.21	1.72	2.78	2.29	3.24	2.27	2.75	2.47	1.79	1.78	1.19	1.14
Walnuts	1.19	1.70	2.70	2.61	3.74	4.28	5.87	5.93	3.94	2.93	1.67	1.14
Misc. Deciduous	1.19	1.70	3.12	3.07	4.51	4.33	5.31	4.87	3.31	2.88	1.64	1.14
Grain and Grain Hay	1.30	1.78	3.77	4.91	3.97	0.26	0.03	0.07	0.18	1.12	1.26	1.47
Corn and Grain Sorghum	1.28	1.78	3.22	2.58	3.05	4.42	6.74	5.77	06.0	0.40	1.18	1.15
Misc. field crops	1.28	1.78	2.84	2.86	4.67	4.94	5.72	2.51	0.18	0.40	1.18	1.15
Alfalfa Hay and Clover	1.30	1.77	3.79	4.88	5.47	4.97	5.46	5.47	3.67	1.93	1.67	1.76
Pasture and Misc. Grasses	1.28	1.78	3.65	4.40	5.17	5.02	5.81	5.76	3.82	3.18	1.80	1.15
Small Vegetables	1.28	1.78	3.65	3.66	4.07	5.28	2.18	0.07	0.18	0.40	1.18	1.15
Tomatoes and Peppers	1.28	1.78	3.04	3.53	5.07	5.52	6.35	2.43	0.18	0.40	1.18	1.15
Melons, Squash, and Cucumbers	1.28	1.78	2.82	3.29	5.11	5.14	2.57	0.07	0.18	0.40	1.18	1.15
Onions and Garlic	1.29	1.78	3.63	4.45	4.79	16.1	0.03	0.07	0.18	0.40	1.64	1.36
Citrus (no ground cover)	1.21	1.70	3.72	4.20	4.43	3.57	3.61	3.65	2.55	2.28	1.69	1.75
Immature Citrus	1.23	1.72	3.38	2.95	3.28	1.64	2.03	1.70	1.27	1.27	1.53	1.48
Avocado	1.19	1.70	3.12	3.07	4.51	4.33	5.31	4.87	3.31	2.88	1.64	1.14
Idle	1.31	1.81	2.72	1.82	2.19	0.18	0.03	0.07	0.18	0.40	1.19	1.15

Amnual

July | August | September | October | November | December

1998 (Wet Y ear)

June

May

April

January February March

inches

33.26

42.90

37.06 20.12 32.46

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42.14

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29.50

24.87

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31.90

36.56 24.64

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ear
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Zone 6 Monthly Evapotranspiration Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo

Table does not include adjustments for hare spots and red uced vigor

						1	998 (Wei	t Year)					
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	5.02	10.54	3.20	1.57	1.92	0.21	0.00	0.05	0.17	0.39	1.94	0.65	25.66
Grass Reference ETo	1.56	1.53	3.17	4.33	4.98	5.28	6.51	6.29	4.32	3.74	2.00	1.91	45.65
Apple, Pear, Cherry, Plum and Prune	1.62	1.70	2.17	2.88	4.01	4.06	5.77	5.35	3.63	2.84	0.99	1.16	36.19
Apples, Plums, Cherries etc w/covercrop	1.80	1.73	3.66	4.63	5.29	5.80	6.99	6.65	4.67	3.66	2.05	2.06	48.99
Peach, Nectarine and Apricots	1.62	1.70	2.17	2.92	4.42	4.56	5.48	5.42	3.64	3.18	1.02	1.16	37.31
Immature Peaches, Nectarines, etc	1.63	1.72	2.09	2.43	3.09	2.35	2.81	2.55	2.18	1.63	0.93	1.16	24.57
Almonds	1.62	1.70	2.17	3.25	4.74	4.37	5.43	5.25	3.46	3.02	1.64	1.16	37.83
Almonds w/covercrop	1.79	1.73	3.50	4.46	5.34	5.45	6.27	6.02	4.32	3.31	1.96	1.97	46.12
Immature Almonds	1.63	1.72	2.09	2.58	3.29	2.32	2.72	2.62	1.89	1.89	1.25	1.16	25.17
Walnuts	1.62	1.70	1.99	2.73	3.78	4.25	6.30	6.15	4.21	3.33	1.78	1.16	39.01
Misc. Deciduous	1.63	1.70	2.46	3.21	4.63	4.37	5.46	5.24	3.44	3.28	1.73	1.16	38.31
Grain and Grain Hay	1.81	1.81	3.64	4.83	3.59	0.29	0.00	0.05	0.17	1.11	1.04	1.65	19.97
Safflower and Sunflower	1.66	1.80	2.60	4.73	5.63	5.21	1.51	0.05	0.17	0.36	0.91	1.17	25.81
Corn and Grain Sorghum	1.66	1.78	2.62	2.58	2.91	4.54	7.12	5.81	0.82	0.36	0.91	1.17	32.28
Misc. field crops	1.66	1.78	2.14	3.02	4.78	5.10	5.95	2.28	0.17	0.36	0.91	1.17	29.32
Alfalfa Hay and Clover	1.83	1.80	3.54	4.94	5.67	5.13	5.79	5.60	3.84	2.05	1.96	2.14	44.27
Pasture and Misc. Grasses	1.66	1.81	3.15	4.42	5.32	5.10	6.13	5.93	4.18	3.55	2.18	1.17	44.60
Small Vegetables	1.77	1.80	3.40	3.58	4.26	5.46	2.10	0.05	0.17	0.36	0.91	1.17	25.04
Tomatoes and Peppers	1.66	1.78	2.35	3.64	5.29	5.66	6.73	2.59	0.17	0.36	0.91	1.17	32.32
Potatoes, Sugar beets, Turnips etc.	1.67	1.78	2.47	2.35	2.59	2.98	6.39	7.03	4.79	4.17	2.33	1.89	40.44
Melons, Squash, and Cucumbers	1.66	1.78	2.12	3.49	5.27	5.29	2.60	0.05	0.17	0.36	0.91	1.17	24.88
Onions and Garlic	1.78	1.81	3.37	4.42	4.74	1.74	0.00	0.05	0.17	0.36	1.62	1.47	21.52
Citrus (no ground cover)	1.79	1.73	3.57	4.16	4.43	3.52	3.96	3.60	2.82	2.43	1.93	2.03	35.96
Immature Citrus	1.74	1.75	2.78	3.06	3.05	1.75	2.00	1.81	1.23	1.47	1.56	1.63	23.82
Avocado	1.63	1.70	2.46	3.21	4.63	4.37	5.46	5.24	3.44	3.28	1.73	1.16	38.31
Grape with 40% cover	1.62	1.71	2.21	3.14	3.62	2.41	2.51	1.91	1.05	0.38	0.91	1.16	22.63
Grape with cover crop	1.75	1.74	2.92	3.55	3.99	2.75	3.00	2.78	1.93	1.64	1.48	1.67	29.20
Grape with 60% cover	1.62	1.71	2.21	3.57	4.34	3.40	3.68	2.73	1.40	0.38	0.91	1.16	27.11
Idle	1.67	1.81	2.01	1.94	1.82	0.25	0.00	0.05	0.17	0.36	0.91	1.18	12.16

Year
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Zone 8
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Zone 8 Monthly Evapotranspiration Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for h are spots and red wear

1998 (Wet Y ear)

	January	February	March	April	May	June	July	August	September	October	November	December
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	10.96	19.59	2.98	2.51	4.00	0.01	00.00	00'0	0.11	0.96	6.29	1.22
Grass Reference ETo	0.44	0.91	2.66	4.12	4.03	5.14	6.49	6.19	4.15	3.36	0.96	1.09
Apple, Pear, Cherry, Plum and Prune	0.46	0.98	2.33	3.38	3.64	4.60	6.08	5.77	3.80	3.05	1.01	1.05
Apples, Plums, Cherries etc w/covercrop	0.46	1.00	3.07	4.66	4.52	5.68	7.33	2.08	4.69	3.44	1.02	1.26
Peach, Nectarine and Apricots	0.46	0.98	2.33	3.43	3.95	4.93	6.10	5.79	3.81	3.23	1.01	1.05
Immature Peaches, Nectarines, etc	0.47	1.00	2.23	3.04	3.07	2.69	3.34	2.96	2.32	1.87	0.93	1.06
Almonds	0.46	0.98	2.33	3.78	4.23	4.88	6.03	5.63	3.68	3.03	1.04	1.05
Almonds w/covercrop	0.46	1.00	3.05	4.57	4.52	5.43	6.65	6.58	4.43	3.46	1.07	1.25
Immature Almonds	0.47	1.00	2.23	3.23	3.28	2.76	3.45	26.2	2.37	1.96	0.99	1.06
Walnuts	0.46	0.98	2.13	3.25	3.43	4.71	6:59	6.45	4.30	3.32	1.06	1.05
Misc. Deciduous	0.46	0.98	2.52	3.73	4.13	4.81	5.90	5.45	3.58	3.26	1.04	1.05
Grain and Grain Hay	0.51	1.07	3.12	4.68	3.27	0.36	0.00	00.0	0.07	1.21	0.94	1.21
Safflower and Sunflower	0.51	1.06	2.62	4.72	4.70	5.23	1.25	0.00	0.07	0.60	0.92	1.07
Corn and Grain Sorghum	0.51	1.04	2.53	3.11	2.82	4.67	7.54	6.30	0.89	0.60	0.91	1.07
Misc. field crops	0.51	1.04	2.29	3.51	4.23	5.15	6.34	2.28	0.07	0.60	0.91	1.07
Alfalfa Hay and Clover	0:50	1.06	3.11	4.91	4.72	5.02	5.95	5.57	3.60	2.13	1.06	1.28
Pasture and Misc. Grasses	0.51	1.07	3.00	4.48	4.38	5.12	6.46	6.18	4.10	3.53	1.11	1.07
Small Vegetables	0.51	1.06	2.99	3.90	3.56	5.35	2.34	00'0	0.07	09:0	0.91	1.07
Tomatoes and Peppers	0.51	1.04	2.44	3.97	4.58	5.73	6.86	2.96	0.07	0.60	0.91	1.07
Potatoes, Sugar beets, Turnips etc.	0.51	1.04	2.47	2.98	2.61	3.00	6.49	7.12	4.79	3.90	1.18	1.23
Melons, Squash, and Cucumbers	0.51	1.04	2.27	3.84	4.40	5.25	2.77	0.00	0.07	0.60	0.91	1.07
Onions and Garlic	0.51	1.06	3.00	4.45	4.05	2.17	0.00	00'0	0.07	0.60	1.10	1.17
Citrus (no ground cover)	0.46	1.00	3.06	4.44	4.12	4.18	4.57	4.33	3.13	2.67	1.06	1.26
Immature Citrus	0.47	1.01	2.80	3.63	3.20	2.20	2.61	2.38	1.53	1.99	1.00	1.20
Avocado	0.46	86.0	2.52	3.73	4.13	4.81	5.90	545	3.58	3.26	1.04	1.05
Grape with 40% cover	0.47	66'0	2.33	3.59	3.30	2.43	2.44	1.79	0.89	0.61	0.88	1.05
Grape with cover crop	0.47	1.01	2.85	3.96	3.62	3.19	3.24	2.87	1.74	1.62	0.99	1.20
Grape with 60% cover	0.47	0.99	2.33	3.92	3.76	3.44	3.64	2.64	1.23	0.61	0.88	1.05
Idle	0.52	1.06	2.13	2.59	2.10	0.27	0.00	0.00	0.07	0.60	0.93	1.08

Annual inches 48.64 39.52 36.14

37.08 24.97 37.13

44.21

25.76

42.47

37.72

36.91

16.43 22.75 31.99 38.90 41.00 22.37 30.74 37.33 22.74 18.18 34.28 24.03

28.01

36.91

20.77 26.76 24.97 11.36

Year
Wet
Zone 9
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Table
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Zone 9 Monthly Evapotranspiration Surface Irrigation Wet Y ear

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and red uced vigor

	inches									
Precipitation	4.10	16.38	4.59	1.37	3.g	0.23	0.04	0.02	0.56	
Grass Reference ETo	1.64	1.68	3.03	4.31	4.14	4.94	6.91	6.97	3.80	
Apple, Pear, Cherry, Plum and Prune	1.51	1.87	2.12	2.72	3.34	3.86	5.96	5.88	3.59	
Apples, Plums, Cherries etc w/covercrop	1.93	1.98	3.60	4.58	4.54	5.12	7.47	7.72	4.22	
Peach, Nectarine and Apricots	1.51	1.87	2.12	2.77	3.69	4.16	5.90	5.91	3.44	
Immature Peaches, Nectarines, etc	1.51	1.87	2.02	2.29	2.63	2.11	3.03	2.84	2.12	
Walnuts	1.51	1.87	1.91	2.60	3.21	4.05	6.62	6.93	3.82	
Mise. Deciduous	1.51	1.87	2.40	3.08	3.87	4.07	5.77	5.59	3.46	
Grain and Grain Hay	1.86	2.00	3.50	4.77	2.85	0.27	0.04	0.02	0.53	
Safflower and Sunflower	1.52	1.94	2.56	4.72	4.67	4.74	1.22	0.02	0.53	
Corn and Grain Sorghum	1.52	1.89	2.22	2.37	2.58	4.23	7.59	6.40	0.98	
Misc. field crops	1.52	1.89	2.08	2.90	4.13	4.69	6.51	2.49	0.53	
Alfalfa Hay and Clover	1.91	2.00	3.32	4.98	4.82	5.10	6.12	6.24	3.75	
Pasture and Misc. Grasses	1.52	1.99	3.08	4.30	4.22	4.79	6.54	6.66	3.76	
Small Vegetables	1.78	1.98	3.28	3.47	3.43	5.13	2.29	0.02	0.53	
Tomatoes and Peppers	1.52	1.89	2.29	3.58	4.54	5.25	7.02	2.72	0.53	
Potatoes, Sugar beets, Turnips etc.	1.53	1.89	2.37	2.25	2.25	2.80	6.81	7.80	4.26	
Melons, Squash, and Cucumbers	1.52	1.89	2.06	3.39	4.26	4.98	2.79	0.02	0.53	
Onions and Garlic	1.80	1.99	3.25	4.35	3.90	1.60	0.04	0.02	0.53	
Citrus (no ground cover)	1.90	1.98	3.45	4.01	3.54	2.97	4.32	4.19	2.56	
Immature Citrus	1.74	1.96	2.71	2.89	2.54	1.49	1.93	2.14	1.66	

ETc Table 19.

Annual inches 32.11

November December

July | August | September | October

June

May

April

January February March

1998 (Wet Y ear)

inches 0.29 2.42

inches

inches 0.02 3.74 **18.44**

0.53 0.38

1.26

1.47

30.68 27.64 44.84 43.04

0.37 0.37 **2.13**

0.04

0.04 **3.54** 0.04

23.31

30.24

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0.04 **4.19** 0.04 2.50

0.37

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22.82

35.26

0.42

2.98 1.54 3.12 3.09 0.80

0.37

22.82

37.61 36.47

34.43 47.39

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2.68

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0.57 2.40 10.52

0.38

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3.46 0.53

5.59 0.02

5.77 0.04

4.07 0.23

3.87 1.64

3.08 1.81

2.40

1.87 1.90

1.51

Avocado Idle

1.52

Wet Year
Zone 10
Table 20.
ETc]

Zone 10 Monthly Evapotranspiration

Surface Irrigation Wet Y ear IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for h are spots and reduced vgor 1 able does not include adjustments for h are spots and reduced vgor

						1	998 (We	t Year)					
	January	February	March	April	May	June	July	August	September	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	5.42	15.81	2.36	1.22	3.33	0.17	0.05	60'0	0.32	3.35	3.23	0.64	36.00
Grass Reference ETo	1.42	1.64	3.28	4.63	4.73	5.41	6.73	6.63	4.04	3.68	2.00	1.76	45.94
Apple, Pear, Cherry, Plum and Prune	1.48	1.87	2.02	3.74	5.19	5.17	6.19	6.18	3.81	3.19	1.50	1.04	41.36
Apples, Plums, Cherries etc w/covercrop	1.58	1.90	3.74	5.03	5.14	6.33	7.60	24.7	4.31	3.97	2.40	2.02	51.46
Peach, Nectarine and Apricots	1.48	1.87	1.99	3.53	5.13	5.28	6.16	6.32	3.71	3.11	1.50	1.04	41.09
Immature Peaches, Nectarines, etc	1.50	1.88	1.88	2.69	3.98	3.24	3.89	3.75	2.50	2.22	1.50	1.04	30.04
Almonds	1.48	1.87	2.15	4.10	5.08	5.04	5.93	5.93	3.46	3.19	1.50	1.04	40.75
Almonds w/covercrop	1.58	1.90	3.42	5.07	5.22	5.88	7.04	6.82	4.05	3.27	2.33	1.83	48.39
Immature Almonds	1.50	1.88	2.02	3.06	4.06	3.75	4.37	4.24	2.54	2.65	1.50	1.04	32.60
Walnuts	1.47	1.86	2.10	3.16	5.20	5.75	7.43	7.17	3.94	3.26	1.54	1.04	43.92
Pistachio	1.48	1.87	1.75	2.63	3.93	4.24	6.93	6.89	3.94	3.26	1.54	1.04	39.49
Pistachio w/ covercrop	1.58	1.90	3.42	4.26	4.86	5.55	7.59	7.44	4.39	4.05	2.36	1.86	49.24
Immature Pistachio	1.50	1.88	1.75	2.20	3.28	2.60	4.93	4.67	2.92	2.49	1.52	1.04	30.78
Misc. Deciduous	1.48	1.87	2.02	3.66	5.13	4.90	5.91	6.13	3.46	3.20	1.50	1.04	40.29
Grain and Grain Hay	1.61	1.95	3.77	5.21	3.81	0.27	0.06	0.09	0.30	1.24	1.85	1.18	21.35
Rice	1.55	1.91	1.75	2.16	5.54	6.48	8.21	8.06	2.64	1.25	1.50	1.04	42.11
Cotton	1.55	1.91	1.75	1.83	3.15	3.25	7.06	7.20	4.02	2.44	1.50	1.04	36.71
Safflower and Sunflower	1.55	1.93	2.46	5.12	5.51	5.57	1.69	0.09	0.30	1.24	1.50	1.04	28.02
Com and Grain Sorghum	1.55	1.91	2.38	2.29	3.88	4.82	6.82	5.09	0.51	1.24	1.50	1.04	33.03
Misc. field crops	1.55	1.91	2.38	2.29	3.91	5.12	6.45	2.31	0.30	1.24	1.50	1.04	30.00
Alfalfa Hay and Clover	1.66	1.94	3.54	5.26	5.56	5.27	6.06	5.91	3.94	2.71	2.26	1.95	46.07
Pasture and Misc. Grasses	1.55	1.95	2.93	4.56	5.23	5.39	6.61	6.56	4.03	3.40	1.95	1.04	45.20
Small Vegetables	1.64	1.94	3.31	5.07	2.75	0.23	0.06	1.12	1.29	1.89	2.09	1.89	23.28
Tomatoes and Peppers	1.55	1.91	2.36	2.31	4.46	5.57	6.61	1.02	0.30	1.24	1.50	1.04	29.88
Potatoes, Sugar beets, Turnips etc.	1.55	1.93	2.71	5.20	5.48	5.94	6.48	0.19	0.30	1.24	1.50	1.04	33.58
Melons, Squash, and Cucumbers	1.55	1.91	1.75	1.78	2.58	0.82	4.11	5.40	1.38	1.24	1.50	1.04	25.06
Onions and Garlic	1.61	1.95	3.46	4.56	4.17	1.09	0.06	0.09	0.30	1.24	1.50	1.26	21.30
Citrus (no ground cover)	1.58	1.90	3.53	4.44	4.63	4.12	4.73	4.60	2.96	3.16	2.38	1.93	39.95
Immature Citrus	1.57	1.91	2.64	3.19	3.71	2.59	3.00	2.84	1.81	2.46	2.01	1.48	29.20
Avocado	1.48	1.87	2.02	3.66	5.13	4.90	5.91	6.13	3.46	3.20	1.50	1.04	40.29
Idle	1.57	1.93	1.75	1.78	2.59	0.23	0.06	0.09	0.30	1.24	1.51	1.04	14.10

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ETc Table for Irrigation Scheduling and Design Zone 12 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare goots and reduced vigor

	January	February	March	April	May	June	July	August	September	October	Novemb er	December
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	5.91	10.81	3.00	1.83	2.93	0.39	0.00	0.02	0.16	1.09	3.38	1.07
Grass Reference ETo	0.39	0.81	2.76	4.12	4.08	6.31	7.49	7.00	4.78	3.48	1.05	1.02
Apple, Pear, Cherry, Plum and Prune	0.41	0.90	2.40	3.68	4.51	6.31	6.84	6.71	4.30	256	0.96	1.00
Apples, Plums, Chernes etc w/covercrop	0.41	0.91	3.22	4.65	4.60	7.23	8.52	7.95	5.26	3.30	1.11	1.18
Peach, Nectarine and Apricots	0.41	0.90	2.38	3.50	4.47	6.35	6.90	6.50	4.38	2.50	96.0	1.00
Immature Peaches, Nectannes, etc	0.42	0.91	2.29	2.76	3.52	4.04	4.12	4.09	2.57	1.83	0.97	1.01
Almonds	0.41	0.90	2.55	4.01	4.51	6.13	6.49	6.27	4.35	2.89	1.08	1.00
Almonds w/covercrop	0.41	0.91	3.21	4.69	4.56	6.78	7.89	7.24	4.82	327	1.16	1.18
Immature Almonds	0.42	0.91	2.44	3.08	3.71	4.47	4.78	4.34	3.23	2.01	1.02	1.01
Walnuts	0.41	0.89	2.46	3.16	4.50	6.95	8.17	2.66	4.64	2.80	1.06	1.00
Pistachio	0.41	0.90	2.20	2.73	3.28	5.47	7.68	7.24	4.77	2.77	1.06	1.00
Pistachio w/ covercrop	0.41	0.91	3.21	4.05	4.39	6.81	8.46	7.94	5.30	3.42	1.17	1.18
Immature Pistachio	0.42	0.91	2.20	2.37	2.74	3.39	5.39	4.91	3.31	192	1.02	1.01
Misc. Deciduous	0.41	0.90	2.40	3.61	4.45	6.05	6.57	6.31	4.22	2.55	0.96	1.00
Grain and Grain Hay	0.45	0.96	3.24	4.68	3.26	0.68	0.00	0.02	0.13	0.60	1.01	1.09
Rice	0.45	0.95	2.20	2.40	4.69	7.59	9.14	8.48	2.52	0.60	1.01	1.03
Cotton	0.45	0.95	2.20	2.02	2.68	4.20	7.82	7.60	4.89	2.07	1.00	1.03
Safflower and Sunflower	0.45	0.95	2.67	4.66	4.75	6.47	1.38	0.02	0.13	0.60	1.01	1.03
Corn and Grain Sorghum	0.45	0.95	2.67	2.68	3.19	5.92	7.68	5.55	0.49	0.60	1.00	1.03
Misc. field crops	0.45	0.95	2.67	2.68	3.19	6.15	7.15	2.61	0.13	0.60	1.00	1.03
Alfalfa Hay and Clover	0.45	0.95	3.23	4.88	4.86	6.41	6.73	6.24	4.24	2.07	1.16	1.20
Pasture and Misc. Grasses	0.45	0.96	3.06	4.19	4.48	6.27	7.36	6.95	4.69	3.11	1.17	1.03
Small Vegetables	0.45	0.95	3.03	4.53	2.79	0.60	0.00	1.10	1.14	127	1.11	1.18
Tomatoes and Peppers	0.45	0.95	2.57	2.51	3.58	6.74	6.87	0.77	0.13	0.60	1.00	1.03
Potatoes, Sugar beets, Turnips etc.	0.45	0.95	2.78	4.73	4.57	6.99	7.20	0.13	0.13	0.60	1.00	1.03
Melons, Squash, and Cucumbers	0.45	0.95	2.20	2.02	2.52	1.32	4.53	5.76	1.76	0.60	1.00	1.03
Onions and Garlic	0.45	0.95	3.10	4. 1 8	3.74	1.60	0.00	0.02	0.13	0.60	1.20	1.09
Citrus (no ground cover)	0.41	0.91	3.22	4.14	4.27	5.15	5.15	4.75	3.24	2.76	1.15	1.18
Immature Citrus	0.42	0.92	2.86	3.14	3.36	3.18	3.19	2.90	1.94	1.80	1.08	1.13
Avocado	0.41	0.90	2.40	3.61	4.45	6.05	6.57	6.31	4.22	2.55	0.96	1.00
Grape Vines with 80% canopy	0.42	0.91	2.24	2.63	3.62	5.27	5.96	4.92	2.68	0.62	0.97	1.01
Grape Vines with cover crop (80% canopy)	0.42	0.92	3.17	3.82	4.32	6.14	6.44	5.84	3.38	2.14	1.13	1.18
Immature Grapes Vines with 50% canopy	0.43	0.92	2.23	2.42	2.98	3.74	4.14	3.47	1.73	0.66	0.98	1.02
Idle	0.46	0.96	2.20	2.03	2.15	0.59	0.00	0.02	0.13	0.60	1.02	1.04

 $\begin{array}{c} 40.24\\ 40.26\\ 28.54\\ 46.12\\ 31.41\\ 45.17\\ 39.52\\ 39.54\\ 47.25\\ 39.44\\ 47.25\\ 39.44\\ 47.25\\ 39.44\\ 47.25\\ 39.44\\ 43.72\\ 31.24\\ 31$

Annual inches

1998 (Wet Year)

30.61 43.29 40.58 48.36

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Zone 13 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and red uced vigor

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
recipitation	8.80	9.21	3.72	2.76	3.33	1.22	0.08	00'0	LL^{0}	0.63	3.94	1.20	35.65
rass Reference ETo	1.01	0.99	2.74	3.84	3.92	5.85	8.24	8.25	4.86	3.41	1.21	1.01	45.33
pple, Pear, Cherry, Plum and Prune	1.07	1.14	2.05	2.75	3.92	5.84	7.86	7.76	4.87	3.14	1.36	1.00	42.75
pples, Plums, Cherries etc w/covercrop	1.24	1.15	3.23	4.33	4.53	6.69	9.67	9.72	5.61	3.67	1.41	1.19	52.44
Imonds	1.07	1.14	2.05	2.69	3.80	5.46	7.55	7.43	4.45	3.16	1.42	1.00	41.21
Imonds w/covercrop	1.23	1.15	3.07	3.92	4.41	6.19	8.84	8.81	5.28	3.63	1.44	1.18	49.15
amature Almonds	1.07	1.14	2.00	2.49	3.37	4.16	5.39	5.25	3.50	2.26	1.37	1.00	33.01
alnuts	1.07	1.13	1.93	2.74	3.79	5.82	8.46	8.80	5.28	3.33	1.42	1.00	44.77
stachio	1.07	1.14	1.93	2.74	3.59	5.39	8.46	8.71	5.36	3.31	1.43	1.00	44.11
stachio w/ covercrop	1.23	1.15	3.07	3.88	4.30	6.42	9.43	9.68	5.77	3.93	1.43	1.18	51.46
amature Pistachio	1.07	1.14	1.92	2.45	3.22	3.71	5.83	6.06	3.77	2.44	1.36	1.00	33.98
lisc. Deciduous	1.07	1.14	1.93	2.60	3.51	5.09	7.69	151	16.4	3.15	1.37	1.00	41.02
rain and Grain Hay	1.13	1.18	3.20	4.45	3.75	1.45	0.08	00'0	0.61	0.55	1.27	1.07	18.73
e	1.07	1.16	1.91	2.53	4.52	7.08	10.20	10.19	3.25	0.55	1.26	1.01	44.72
otton	1.07	1.16	1.91	2.34	3.30	5.64	8.67	8.53	2.11	0.59	1.26	1.01	37.59
orn and Grain Sorghum	1.07	1.16	2.15	2.63	3.55	6.14	8.91	18.7	1.35	0.55	1.26	1.01	37.58
isc. field crops	1.07	1.16	2.15	2.63	3.56	5.92	8.09	3.46	0.62	0.55	1.26	1.01	31.47
falfa Hay and Clover	1.21	1.17	3.00	4.62	4.71	6.74	7.50	7.35	4.53	1.93	1.39	1.19	45.34
isture and Misc. Grasses	1.07	1.18	2.78	4.00	4.42	6.20	8.23	8.25	4.95	3.07	1.41	1.01	46.57
aall Vegetables	1.12	1.17	2.88	2.20	2.77	1.37	0.08	1.13	1.34	1.36	1.37	1.15	17.93
omatoes and Peppers	1.07	1.16	2.49	2.59	3.82	6.42	7.76	0.91	0.62	0.55	1.26	1.01	29.66
isc Subtropical	1.07	1.14	1.93	2.60	3.51	5.09	7.69	7.57	4.91	3.15	1.37	1.00	41.02
rape Vines with 80% canopy	1.07	1.14	2.04	2.92	4.03	5.33	6.24	5.45	3.20	0.62	1.26	1.00	34.32
rape Vines with cover crop (80% canopy)	1.21	1.16	2.93	3.80	4.38	5.65	7.38	6.61	3.38	2.10	1.34	1.16	41.11
amature Grapes Vines with 50% canopy	1.07	1.15	2.00	2.62	3.53	4.29	4.71	3.99	2.52	09:0	1.26	1.01	28.73
	1.07	1.17	1.90	2.16	2.78	1.37	0.08	0.00	0.62	0.54	1.26	1.01	13.97

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ETc Table for Irrigation Scheduling and Design Zone 14 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare gots and reduced vgor

1998 (Wet Year)

inches	 inches 1.90 1.91 4.30 4.90 3.89 4.90 4.90 3.69 4.91 3.69 3.69 3.69 3.24 3.32 3.33 3.32 3.33 3.32 3.32<	inches 3.75 4.13 4.71 4.75 4.75 4.75 4.76 4.75 4.76 4.76 3.91 4.76 4.76 4.76 4.76 4.76 3.91 3.91 3.91 3.91 3.91 3.91 3.91 3.91	inches 0.48 0.48 0.48 0.48 0.63 0.63 0.68 0.68 0.68 0.68 0.68 0.63 0.63 0.63 0.63 0.63 0.73 0.63 0.73 0.63 0.78 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.78 0.65 0.78 0.65 0.78 0.65 0.78 0.73 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75	inches 0.02 7.87 7.45 9.08 9.08 7.57 7.57 7.57 7.08 8.41 5.18 8.83 8.83 8.83 8.83 8.83 9.04 9.04 9.02 9.75 9.75	inches 0.01 7.21 6.99 6.99 6.92 6.92 6.92 6.92 7.65 8.01 8.01 8.41 8.41 8.41 8.88 8.88	inches 0.35 0.35 5.01 4.71 4.71 4.63 3.14 4.48 3.14 4.48 5.03 5.17 5.17 5.17 5.17 0.29 0.29	inches 1.14 1.14 3.86 3.05 3.05 3.07 1.96 1.96 2.95 3.47 2.95 3.47 2.95 3.07 1.96 1.96 1.96 2.95 3.07 1.96 1.96 1.96 1.14 1.14 1.14 1.14 1.14 1.14 1.14 1.14 1.14 1.16 1.16 1.16 1.16 1.16 1.16 1.16 1.16 1.16 1.16 1.16 1.26	inches 3.94 1.19 1.10 1.10 1.10 1.11 1.11 1.11 1.11	inches 1.21 1.21 1.17 1.10 1.10 1.10 1.10 1.10 1.10 1.1	inches 34.20 34.20 34.20 34.20 33.20 31.30 31.30 31.30 33.38 33.38 33.38 550.94 450.93 33.38 550.94 550.950.95 550
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eld crops 0.47 1.01 2.64 Hay and Clover 0.47 1.02 3.37 and Mise. Grasses 0.47 1.02 3.18 "egetables 0.47 1.02 3.18 "egetables 0.47 1.02 3.18 "egetables 0.47 1.02 3.18 es and Peppers 0.47 1.01 2.61 s, Sugar beets, Turnips etc. 0.47 1.01 2.22 and Garlio 0.47 1.01 3.25	1 2.85	3.55	6.37	8.25	5.32	0.58	0.68	1.14	1.11	33.96
Hay and Clover 0.47 1.02 3.37 and Misc. Grasses 0.47 1.02 3.18 regetables 0.47 1.02 3.18 regetables 0.47 1.02 3.18 samd Peppers 0.47 1.01 2.61 s, Sugar beets, Turnips etc. 0.47 1.01 2.22 and Garlin 0.47 1.01 2.32	1 2.85	3.55	6.63	7.60	2.90	0.29	0.68	1.14	1.11	30.85
and Misc. Grasses 0.47 1.02 3.18 regetables 0.47 1.02 3.18 res and Peppers 0.47 1.01 2.61 ss, Sugar beets, Turnips etc. 0.47 1.01 2.59 and Carlier 0.47 1.01 2.22	5.09	4.97	6.3	7.15	6.45	4.4	2.26	1.31	1.37	44.69
regetables 0.47 1.02 3.18 ies and Peppers 0.47 1.01 2.61 ss, Sugar beets, Turnips etc. 0.47 1.02 2.89 so, Sugar beets, Turnips etc. 0.47 1.01 2.22 and Carlier 0.47 1.01 2.32	8.42	4.66	6.73	7.87	7.19	5.00	3.55	1.32	1.11	46.53
oes and Peppers 0.47 1.01 2.61 ss, Sugar beets, Turnips etc. 0.47 1.02 2.89 \$ Squash, and Cucumbers 0.47 1.01 2.22 and Garlie 0.47 1.01 3.55	8 4.75	3.00	0.71	0.02	1.09	1.27	1.46	1.27	1.35	19.58
2s, Sugar beets, Turnips etc. 0.47 1.02 2.89 s, Squash, and Cucumbers 0.47 1.01 2.22 and Garlic 0.47 1.02 3.55	2.60	3.88	7.13	7.48	0.74	0.29	0.68	1.14	1.11	29.14
s, Squash, and Cucumbers 0.47 1.01 2.22 and Garlie 0.47 1.02 3.25	1.95	4.69	7.44	7.43	0.10	0.29	0.68	1.14	1.11	32.20
and Garlie 0.47 1.02 3.25	2.08	2.68	1.46	4.92	6.01	1.95	0.68	1.14	1.11	25.73
	5 4.39	3.97	1.88	0.02	0.01	0.29	0.68	1.37	1.20	18.55
(no ground cover) 0.44 0.97 3.43	\$ 4.43	4.54	5.65	5.61	5.12	3.67	3.34	1.35	1.38	39.94
re Citrus 0.45 0.99 2.98	3.34	3.90	3.58	3.58	3.15	2.35	2.28	1.25	1.26	29.11
lo 0.43 0.96 2.46	3.82	4.68	6.53	7.09	6.77	4.59	2.88	1.10	1.10	42.41
Vines with 80% canopy 0.44 0.98 2.29	0 2.75	4.01	5.71	6.45	5.31	2.73	0.73	1.11	1.11	33.62
Vines with cover crop (80% canopy) 0.45 0.99 3.33	3 4.04	4.56	6.67	7.06	6.21	3.54	2.10	1.22	1.34	41.51
re Grapes Vines with 50% canopy 0.45 0.98 2.27	7 2.51	3.41	4.04	4.62	3.64	2.01	0.70	1.12	1.11	26.84
0.48 1.02 2.22	2.08	2.58	0.71	0.02	0.01	0.29	0.68	1.15	1.12	12.35

ETc Table 24. Zone 15 Wet Year

ETc Table for Irrigation Scheduling and Design Zone 15 Monthly Evapotranspiration

Surface Irrigation Wet Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare gots and reduced vgor

						1	998 (W el	Year)					
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	1.65	7.30	2.74	1.11	1.59	0.35	0.02	0.00	0.15	0.76	0.88	0.70	17.25
Grass Reference ETo	0.93	1.37	3.13	4.73	5.39	7.11	8.52	7.69	5.30	3.61	1.60	1.20	50.58
Apple, Pear, Cherry, Plum and Prune	0.94	1.54	2.27	4.38	5.41	6.94	7.93	6.95	4.37	2.84	0.82	0.85	45.23
Apples, Plums, Chernes etc w/covercrop	1.00	1.55	3.58	5.29	5.64	8.08	9.55	8.55	5.69	3.45	1.49	1.07	54.94
Peach, Nectarine and Apricots	0.94	1.54	2.13	3.62	5.55	6.85	7.89	7.10	4.63	2.74	0.80	0.85	44.63
Immature Peaches, Nectarines, etc	0.95	1.56	2.02	2.71	4.02	4.80	4.97	4.73	3.06	1.83	0.83	0.85	32.33
Almonds	0.94	1.55	2.46	4.92	5.03	6.21	7.22	6.52	4.06	2.36	0.79	0.85	42.91
Almonds w/covercrop	0.96	1.55	3.49	5.15	5.15	7.32	8.27	7.49	4.60	3.13	1.60	1.23	40.93
Immature Almonds	0.95	1.56	2.25	3.59	4.52	5.30	6.09	5.45	3.37	1.90	0.80	0.85	36.65
Walnuts	0.93	1.53	2.38	3.69	5.97	8.09	9.59	8.58	5.19	2.92	1.01	0.85	50.75
Pistachio	0.94	1.54	1.91	2.60	3.50	5.72	9.05	8.29	5.35	2.72	0.96	0.85	43.42
Pistachio w/ covercrop	1.01	1.55	3.44	4.36	5.27	7.43	9.91	8.88	5.95	3.76	1.78	1.33	54.66
Immature Pistachio	0.95	1.56	1.91	2.16	2.58	4.12	6.19	5.77	3.61	2.09	0.92	58.0	32.71
Misc. Deciduous	0.94	1.54	2.27	4.27	5.44	6.50	7.52	6.66	4.55	2.50	0.79	0.85	43.82
Grain and Grain Hay	1.04	1.62	3.62	5.31	3.44	0.38	0.02	0.00	0.15	0.60	1.20	1.01	18.40
Rice	1.00	1.60	1.91	2.11	6.01	8.66	10.61	9.45	2.40	0.60	0.79	0.86	46.10
Cotton	1.00	1.60	1.91	1.77	2.42	4.56	9.21	8.36	5.54	2.17	0.79	0.86	40.18
Safflower and Sunflower	1.00	1.61	2.59	5.33	6.36	7.16	1.00	0.00	0.15	0.60	0.79	0.86	27.45
Corn and Grain Sorghum	1.00	1.60	2.41	2.59	3.48	6.69	8.83	6.55	0.54	0.60	0.79	0.86	35.94
Misc. field crops	1.00	1.60	2.41	2.59	3.47	6.98	8.41	3.27	0.15	0.60	0.79	0.86	32.12
Alfalfa Hay and Clover	1.08	1.61	3.51	5.54	6.24	7.20	7.71	6.88	4.86	2.12	1.63	1.36	49.74
Pasture and Misc. Grasses	1.00	1.62	3.04	4.69	5.77	7.18	8.52	7.69	5.30	3.29	1.25	0.87	50.22
Small Vegetables	1.08	1.62	3.30	5.18	2.63	0.36	0.02	1.12	1.34	1.23	1.44	1.34	20.66
Tomatoes and Peppers	1.00	1.60	2.41	2.28	4.20	7.74	7.70	0.65	0.15	0.60	0.79	0.86	29.98
Potatoes, Sugar beets, Turmps etc.	1.04	1.61	2.80	5.40	6.17	8.01	8.28	0.09	0.15	0.60	0.79	0.86	35.80
Melons, Squash, and Cucumbers	1.00	1.60	1.91	1.71	1.85	1.25	5.44	6.32	1.71	0.60	0.79	0.86	25.05
Onions and Garlic	1.04	1.62	3.37	4.68	4.00	0.93	0.02	0.00	0.15	0.60	1.38	1.03	18.81
Citrus (no ground cover)	1.01	1.55	3.51	4.66	5.24	5.61	6.20	5.59	3.97	2.90	1.74	1.32	43.29
Immature Citrus	1.00	1.57	2.75	3.25	3.93	3.55	3.91	3.49	2.48	2.01	1.50	1.21	30.65
Misc Subtropical	0.94	1.54	2.27	4.27	5.44	6.50	7.52	6.66	4.55	2.50	С [.] О	0.85	43.82
Grape Vines with 80% canopy	0.95	1.56	2.07	2.82	4.43	5.52	6.62	5.46	2.57	0.60	0.79	0.85	34.24
Grape Vines with cover crop (80% canopy)	1.02	1.57	3.24	4.20	4.85	6.81	7.50	6.10	3.30	1.96	1.37	1.13	43.05
Immature Grapes Vines with 50% canopy	0.97	1.57	2.02	2.41	3.30	4.34	5.12	3.97	1.94	0.60	0.79	0.85	27.88
Idle	1.02	1.62	1.91	1.71	1.60	0.36	0.02	0.00	0.15	0.60	0.79	0.86	10.65

ETc Table for Irrigation Scheduling and Design Zone 16 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo

Table does not include adjustments for hare spots and reduced vigor

							998 (We	t Year)					
	January	February	March	April	May	June	July	August	September	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	6.30	4.93	2.67	0.98	3.33	0.83	0.01	0.01	0.16	0.29	0.56	0.41	20.47
Grass Reference ETo	0.92	1.25	2.97	4.78	5.20	6.93	8.43	8.00	5.51	3.89	1.60	1.16	50.63
Apple, Pear, Cherry, Plum and Prune	0.94	1.37	1.78	4.32	5.87	6.86	7.83	7.27	4.90	2.41	0.48	0.46	44.48
Apples, Flums, Chernes etc w/covercrop	0.99	1.40	3.32	5.37	5.27	8.19	9.34	9.02	5.97	3:55	1.40	1.08	54.89
Peach, Nectarine and Apricots	0.94	1.37	1.65	3.52	5.80	7.02	7.96	7.41	4.87	2.56	0.48	0.46	44.05
Immature Peaches, Nectarines, etc	0.96	1.38	1.54	2.59	4.57	4.70	5.29	4.82	3.26	1.37	0.48	0.46	31.42
Almonds	0.94	1.38	1.97	4.91	5.61	6.42	6.09	6.82	4.67	2.17	0.48	0.46	42.52
Almonds w/covercrop	0.98	1.40	3.09	5.39	5.38	7.26	8.24	7.58	5.01	2.77	1.22	0.97	49.29
Immature Almonds	0.96	1.40	1.76	3.51	5.17	5.49	5.96	5.59	3.61	1.69	0.48	0.46	36.09
Walnuts	0.94	1.36	1.89	3.59	6.08	8.11	9.40	10'6	5.53	2.70	0.63	0.47	49.70
Pistachio	0.94	1.37	1.41	2.51	4.31	6.08	8.93	8.73	5.69	2.76	0.63	0.47	43.84
Pistachio w/ covercrop	0.99	1.40	3.02	4.34	5.65	7.76	9.74	9.46	6.27	3.96	1.49	1.12	55.19
Immature Pistachio	0.96	1.38	1.42	2.06	3.54	4.31	6.11	6.06	3.84	1.89	0.52	0.47	32.57
Misc. Deciduous	0.94	1.37	1.78	4.20	5.84	6.66	7.36	6.97	4.79	2.46	0.48	0.46	43.30
Grain and Grain Hay	1.04	1.47	3.41	5.37	4.27	0.92	0.01	0.01	0.14	0.24	0.92	0.65	18.46
Cotton	1.01	1.43	1.44	1.62	3.39	4.84	9.15	8.77	5.71	2.01	0.48	0.46	40.32
Safflower and Sunflower	1.01	1.45	2.15	5.35	6.17	6.67	1.31	0.01	0.14	0.24	0.48	0.46	25.46
Corn and Grain Sorghum	1.01	1.43	2.07	2.64	4.12	6.67	8.88	6.38	0.54	0.24	0.48	0.46	34.92
Misc. field crops	1.01	1.43	2.07	2.64	4.14	6.84	8.29	3.26	0.14	0.24	0.48	0.46	31.01
Alfalfa Hay and Clover	1.06	1.46	3.27	5.51	5.99	7.58	7.63	7.16	5.01	1.92	1.45	1.26	49.30
Pasture and Misc. Grasses	1.01	1.47	2.58	4.67	5.81	7.19	8.50	8.02	5.50	3.45	0.95	0.48	49.61
Small Vegetables	1.06	1.46	3.00	5.22	3.34	0.87	0.01	1.14	1.39	1.24	1.26	1.25	21.25
Tomatoes and Peppers	1.01	1.43	2.04	2.19	4.68	7.49	7.59	0.55	0.14	0.24	0.48	0.46	28.32
Potatoes, Sugar beets, Turnips etc.	1.01	1.45	2.40	5.47	5.98	7.90	7.92	0.09	0.14	0.24	0.48	0.46	33.55
Melons, Squash, and Cucumbers	1.01	1.43	1.44	1.62	3.13	1.74	5.43	6.51	2.14	0.24	0.48	0.46	25.64
Onions and Garlic	1.04	1.47	3.09	4.66	4.28	1.42	0.01	0.01	0.14	0.24	1.18	0.65	18.20
Citrus (no ground cover)	0:00	1.40	3.14	4.64	5.73	5.88	6.19	5.78	4.17	3.00	1.56	1.26	43.72
Immature Citrus	1.00	1.41	2.26	3.16	4.56	3.91	3.95	3.66	2.66	1.91	1.06	0.92	30.45
Misc Subtropical	0.94	1.37	1.78	4.20	5.84	6.66	7.36	6.97	4.79	2.46	0.48	0.46	43.30
Grape Vines with 80% canopy	0.96	1.38	1.59	2.70	5.05	5.55	6.84	5.55	2.53	0.31	0.48	0.46	33.41
Grape Vines with cover crop (80% canopy)	0.98	1.42	2.77	4.06	5.33	6.62	7.51	6.45	3.38	1.66	0.91	0.78	41.87
Immature Grapes Vines with 50% canopy	0.97	1.40	1.54	2.28	4.04	4.74	4.88	4.29	1.99	0.36	0.48	0.46	27.42
Idle	1.03	1.46	1.44	1.62	2.67	0.88	0.01	0.01	0.14	0.24	0.48	0.46	10.45

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Zone 18 Monthly Evapotranspiration

Surface Irrigation Wet Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare spots and red uced vigor

Precipitation	0.66	0.06	0.04	0.17	0.10	0.08	0.25	0.04	1.35
Grass Reference ETo	2.67	3.91	6.09	7.41	8.59	9.49	9.30	8.73	5.97
Peach, Nectarine and Apricots	0.64	0.12	2.60	4.16	7.95	10.12	9.98	9.32	6.45
Grain and Grain Hay	1.69	4.10	6.94	6.68	09'0	0.09	0.24	90'0	1.14
Cotton	0.63	0.11	1.04	1.63	2.42	8.35	10.76	10.19	6.70
Safflower and Sunflower	1.17	0.62	2.35	7.61	10.18	9.23	1.04	0.06	1.14
Corn and Grain Sorghum	1.48	1.14	5.61	8.98	9.63	3.00	0.24	0.06	1.14
Misc. field crops	1.35	1.20	5.54	26.7	4.80	0.10	0.24	90'0	1.14
Alfalfa Hay and Clover	2.81	3.05	5.62	7.59	7.59	8.73	8.43	8.02	6.59
Pasture and Misc. Grasses	0.63	2.10	2.27	5.30	7.64	9.22	8.87	8.27	5.63
Small Vegetables	2.52	2.57	6.24	2.57	0.12	0.09	0.24	0.06	2.70
Tomatoes and Peppers	1.53	0.63	4.05	8.78	10.06	4.04	0.24	90'0	1.14
Potatoes, Sugar beets, Turnips etc.	3.23	4.82	7.52	9.14	8.43	0.25	0.24	0.06	1.95
Melons, Squash, and Cucumbers	1.53	0.57	3.76	8.10	9.27	4.02	0.24	0.06	1.14
Onions and Garlic	2.93	4.10	6.33	6.82	1.76	0.13	0.24	0.06	1.95
Citrus (no ground cover)	2.71	2.65	4.60	5.74	6.54	7.41	7.47	6.70	5.34
Grape Vines with 80% canopy	0.64	0.12	2.60	4.16	2672	10.12	9.98	9.32	6.45
Idle	0.63	0.11	0.10	0.17	0.10	0.09	0.24	0.06	1.13

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Zone 1 Monthly Evapotranspiration

Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and reduced vigor

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	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	3.23	3.98	0.47	00'0	00.00	0.00	0.39	0.12	0.00	0.12	2.04	0.13	10.48
Grass Reference ETo	1.41	1.54	2.64	3.97	4.28	4.19	4.12	3.33	2.11	2.66	1.18	1.57	33.00
Apple, Pear, Cherry, Plum and Prune	0.62	1.59	1.06	06'0	1.86	2.99	3.64	2.85	1.67	2.00	1.01	0.67	20.85
Apples, Plums, Cherries etc w/covercrop	1.38	1.67	2.65	3.03	4.02	3.99	4.43	3.40	2.33	2.42	1.15	1.66	32.13
Peach, Nectarine and Apricots	0.62	1.59	1.06	0.94	2.38	3.33	3.67	2.86	1.71	2.27	1.00	0.67	22.11
Immature Peaches, Nectarines, etc	0.63	1.62	0.89	0.47	1.09	1.69	2.06	1.62	0.85	1.04	1.00	0.66	13.62
Mise. Deciduous	0.62	1.60	1.27	1.21	2.51	3.45	3.39	2.74	1.73	2.30	1.21	0.67	22.68
Grain and Grain Hay	1.25	1.79	2.94	4.34	2.36	0.01	0.30	0.18	0.02	08'0	1.08	1.16	l6.24
Corn and Grain Sorghum	0.66	1.69	1.16	1.11	0.89	3.44	4.50	3.33	0.53	0.10	1.04	0.65	19.10
Misc. field crops	0.66	1.71	0.95	1.02	3.15	4.08	3.90	1.34	0.02	0.10	1.04	0.65	18.60
Alfalfa Hay and Clover	1.50	1.79	2.83	3.77	3.85	3.77	3.76	3.23	2.10	1.53	1.22	1.71	31.06
Pasture and Misc. Grasses	0.66	1.78	2.17	3.23	4.01	3.96	4.01	3.20	2.00	2.53	1.30	0.79	29.64
Small Vegetables	0.68	1.77	2.70	2.73	2.34	4.25	2.07	0.19	0.02	0.10	1.04	1.06	18.95
Tomatoes and Peppers	0.66	1.69	1.11	1.84	4.20	4.44	4.26	1.49	0.02	0.10	1.04	0.65	21.49
Potatoes, Sugar beets, Turnips etc.	0.68	1.69	1.40	0.79	0.66	2.15	3.99	3.70	2.33	2.96	1.39	1.45	23.20
Melons, Squash, and Cucumbers	0.66	1.70	0.94	1.73	4.28	4.14	2.08	0.22	0.02	0.10	1.04	0.65	17.55
Citrus (no ground cover)	1.29	1.67	2.43	2.48	2.74	2.38	2.68	2.25	1.15	1.79	1.14	1.62	23.63
Immature Citrus	1.29	1.70	1.63	1.11	1.26	1.19	1.49	1.23	0.57	0.76	1.08	1.18	14.48
Avocado	0.62	1.60	1.27	1.21	2.51	3.45	3.39	2.74	1.73	2.30	1.21	0.67	22.68
Idle	0.67	1.72	0.70	00'0	00.00	0.00	0.31	0.18	0.02	0.10	1.06	0.64	5.40

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Zone 3 Monthly Evapotranspiration

Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and reduced vigor

	inches											
Precipitation	2.35	1.06	1.85	0.57	0.05	0.00	0.01	0.00	0.03	0.00	0.33	0.11
Grass Reference ETo	0.90	1.77	3.40	5.27	7.74	8.10	8.47	7.34	5.84	4.09	1.82	1.53
Apple, Pear, Cherry, Plum and Prune	0.64	1.80	2.76	2.41	2.38	3.98	5.13	3.76	3.12	2.23	1.14	0.95
Apples, Pluns, Cherries etc w/covercrop	1.40	1.86	3.32	4.64	4.38	5.85	6.07	4.84	3.71	2.94	1.39	1.86
Peach, Nectarine and Apricots	0.64	1.80	2.76	2.45	16.2	4.63	4.74	4.09	2.78	2.61	1.16	0.95
Immature Peaches, Nectarines, etc	0.65	1.81	2.71	1.95	1.41	2.28	2.54	1.92	1.40	1.65	1.13	0.94
Almonds	0.64	1.80	2.76	2.80	3.40	4.43	4.65	3.82	2.83	2.50	1.38	0.95
Almonds w/covercrop	1.24	1.86	3.32	4.29	4.25	5.54	5.40	4.50	3.30	2.92	1.35	1.78
Immature Almonds	0.65	1.81	2.71	2.11	1.63	2.23	2.50	1.91	1.38	1.66	1.28	0.94
Walnuts	0.64	1.80	2.62	2.13	2.10	4.28	5.43	4.54	3.32	2.70	1.38	0.95
Misc. Deciduous	0.64	1.80	2.90	2.76	3.25	4.43	4.68	3.75	2.90	2.66	1.40	0.95
Grain and Grain Hay	1.19	1.93	3.39	5.05	2.74	0.17	0.02	0.02	0.06	0.92	1.19	1.43
Safflower and Sunflower	0.84	1.89	3.05	4.69	5.70	5.54	1.32	0.02	0.06	0.19	1.16	0.93
Corn and Grain Sorghum	0.66	1.85	3.02	1.90	1.18	4.65	6.24	4.40	0.63	0.19	1.16	0.93
Misc. field crops	0.66	1.86	2.78	2.56	3.89	5.21	5.34	1.91	0.06	0.19	1.16	0.93
Alfalfa Hay and Clover	1.41	1.92	3.41	5.16	4.61	5.03	4.95	4.44	3.22	1.69	1.41	1.88
Pasture and Misc. Grasses	0.66	1.93	3.34	4.27	4.92	5.12	5.40	4.43	3.28	3.15	1.51	0.98
Small Vegetables	0.67	1.91	3.30	3.21	3.14	5.55	2.19	0.02	0.06	0.19	1.16	1.22
Tomatoes and Peppers	0.66	1.85	2.90	3.25	5.11	5.80	5.82	1.64	0.06	0.19	1.16	0.93
Potatoes, Sugar beets, Turnips etc.	0.69	1.85	2.68	1.90	0.88	3.04	5.53	5.21	3.79	3.67	1.62	1.63
Melons, Squash, and Cucumbers	0.66	1.85	2.78	3.09	5.20	5.39	2.57	0.02	0.06	0.19	1.16	0.93
Onions and Garlic	1.04	1.92	3.30	4.44	4.64	2.07	0.02	0.02	0.06	0.19	1.48	1.21
Flowers, Nursery and Christmas Tree	0.64	1.80	2.90	2.76	3.25	4.43	4.68	3.75	2.90	2.66	1.40	0.95
Citrus (no ground cover)	1.27	1.86	3.32	3.96	3.12	3.50	3.42	2.66	2.15	2.13	1.34	1.81
Immature Citrus	1.03	1.87	3.13	2.61	1.43	1.64	1.83	1.36	0.94	1.02	1.28	1.42
Avocado	0.64	1.80	2.90	2.76	3.25	4.43	4.68	3.75	2.90	2.66	1.40	0.95
Grape with 40% cover	0.64	1.79	2.75	2.63	2.05	2.23	2.12	1.33	0.75	0.20	1.10	0.94
Grape with cover crop	0.99	1.87	3.18	3.13	2.54	2.75	2.67	2.01	1.45	1.28	1.27	1.50
Grape with 60% cover	0.64	1.79	2.75	3.10	3.09	3.33	3.20	1.98	1.02	0.21	1.10	0.94
Idle	0.67	1.86	2.66	1.45	0.07	0.16	0.02	0.02	0.06	0.19	1.18	0.92

Annual inches

July | August | September | October | November | December

1999 (Dry Y ear)

June

May

April

January February March

30.28

42.25 31.52 20.39

56.27

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25.38 26.80 26.55 38.98 22.62

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Zone 4 Monthly Evapotranspiration Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for have spots and red wear

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Apple, Pear, Cherry, Plum and Prune
Apples, Plums, Cherries etc w/covercrop
Peach, Nectarine and Apricots
Immature Peaches, Nectannes, etc
Walnuts
Misc. Deciduous
Grain and Grain Hay
Corn and Grain Sorghum
Misc. field crops
Alfalfa Hay and Clover
Pasture and Misc. Grasses
Small Vegetables
Tomatoes and Peppers
Melons, Squash, and Cucumbers
Onions and Garlic
Citrus (no ground cover)
Immature Citrus
Avocado
Idle

1999 (Dry Year) May June July August Septen
inches inches inches
0.13 0.17 0.05 0.00
5.21 5.77 6.29 5.72
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5.16 6.12 6.47 2.31
5.27 5.69 2.67 0.00
4.63 1.85 0.05 0.00
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Zone 6 Monthly Evapotranspiration

Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and red wear vgor

1999 (Dry Y ear)

	January	February	March	April	IVIay	June	July	August	September	October	November	December	Amua
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
	2.31	2.02	1.87	1.21	0.31	0.16	0.08	0.02	00'0	0.19	0.58	0.20	8.93
nce ETo	2.03	2.34	3.35	4.53	5.44	5.91	6.52	5.79	4.27	3.98	2.05	2.35	48.56
Cherry, Plum and Prune	0.94	1.89	2.10	2.44	2.73	4.53	5.63	5.09	3.52	2.87	0.67	0.21	32.61
s, Cherries etc w/covercrop	1.62	2.66	3.56	4.89	5.06	6.15	7.18	67.9	4.48	3.56	1.92	1.63	49.01
nne and Apricots	0.94	1.89	2.04	2.47	3.33	5.08	5.56	4.95	3.56	3.23	0.54	0.21	33.80
aches, Nectarines, etc	0.94	1.89	1.87	1.92	1.72	2.77	2.77	2.46	1.69	1.81	0.53	0.21	20.58
	0.94	1.89	2.04	2.80	3.73	5.03	5.36	4.65	3.38	3.20	1.15	0.22	34.40
overcrop	1.67	2.67	3.51	4.59	4.79	5.91	6.53	2.68	4.07	3.46	1.66	1.35	45.88
monds	0.94	1.89	1.87	2.08	1.91	2.62	2.77	2.39	1.88	1.66	0.99	0.21	21.22
	0.94	1.89	1.70	2.17	2.40	4.85	6.31	5.68	4.I6	3.42	1.27	0.22	35.00
snor	0.94	1.89	2.33	2.73	3.69	5.03	5.33	4.67	3.40	3.39	1.33	0.25	34.98
rain Hay	1.81	2.74	3.85	5.12	2.89	0.19	0.08	0.02	0.00	0.85	0.68	96.0	19.2]
d Sunflower	1.36	2.16	2.54	4.66	6.07	6.02	1.42	0.02	0.00	0.19	0.53	0.21	25.17
ain Sorghum	0.95	1.90	2.72	2.15	1.48	5.12	7.17	5.52	0.73	0.19	0.53	0.21	28.68
rops	0.95	2.34	1.99	2.46	4.23	5.66	6.10	2.21	0.00	0.19	0.53	0.21	26.87
and Clover	2.21	2.72	3.86	4.97	4.97	5.41	5.79	5:35	3.82	1.95	1.92	2.52	45.48
Misc. Grasses	0.95	2.54	3.17	4.54	5.25	5.66	6.20	5.47	4.04	3.76	1.89	0.27	43.75
ables	1.06	2.44	3.50	3.61	3.55	6.06	2.40	0.02	0.00	0.19	0.53	1.20	24.56
id Peppers	0.95	1.90	2.17	3.19	5.50	6.29	6.70	2.27	0.00	0.19	0.53	0.21	29.91
igar beets, Turnips etc.	0.97	1.90	2.01	2.10	1.24	3.39	6.37	6.47	4.76	4.46	2.28	2.19	38.12
iash, and Cucumbers	0.95	2.35	1.99	3.30	5.48	5.94	2.78	0.02	0.00	0.19	0.53	0.21	23.74
Garlic	1.56	2.63	3.49	4.60	4.70	1.43	0.08	0.02	0.00	0.19	1.16	0.63	20.49
(ound cover)	1.74	2.75	3.71	4.39	3.53	3.66	4.05	3.37	2.65	2.33	1.81	1.84	35.82
trus	1.42	2.42	2.67	2.72	2.00	1.82	1.87	69'I	1.41	1.21	1.09	1.15	21.47
	0.94	1.89	2.33	2.73	3.69	5.03	5.33	4.67	3.40	3.39	1.33	0.25	34.98
10% cover	0.93	1.89	2.03	2.70	2.51	2.57	2.58	1.74	0.86	0.21	0.52	0.21	18.75
over crop	1.35	2.48	2.91	3.30	2.90	2.99	3.11	2.51	1.71	1.51	1.10	0.82	26.6
50% cover	0.93	1.89	2.03	3.13	3.52	3.70	3.76	2.49	1.19	0.22	0.52	0.21	23.55
	0.95	1.91	1.70	1.40	0.33	0.18	0.08	0.02	0.00	0.19	0.53	0.21	7.49

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Zone 8 Monthly Evapotranspiration Surface Irrigation Dry Year

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	January	February	March	April	May	June	July	August	September	October	November	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	3.50	7.21	2.22	1.67	0.20	0.08	0.00	0.01	0.03	0.53	3.46	0.56	19.47
Grass Reference ETo	0.88	1.16	2.60	4.91	6.12	6.58	6.97	5.73	4.39	3.35	1.14	1.50	45.34
Apple, Pear, Cherry, Plum and Prune	0.73	1.33	2.57	2.48	3.15	5.52	6.38	5.49	4.12	2.85	1.04	1.17	36.84
Apples, Plums, Cherries etc w/covercrop	0.99	1.34	3.02	4.91	5.77	7.17	8.05	6.55	4.99	3.44	1.23	1.75	49.23
Peach, Nectarine and Apricots	0.73	1.33	2.57	2.54	3.91	6.26	6.53	5.27	4.11	3.01	1.06	1.17	38.50
Immature Peaches, Nectarines, etc	0.73	1.34	2.48	1.96	2.13	3.38	3.38	2.94	2.26	1.79	0.99	1.17	24.56
Almonds	0.73	1.33	2.57	3.00	4.58	6.19	6.36	5.16	4.06	3.00	1.19	1.17	39.34
Almonds w/covercrop	0.96	1.34	3.00	4.61	5.78	6.91	7.53	6.10	4.60	3.26	1.24	1.69	47.01
Immature Almonds	0.73	1.34	2.48	2.21	2.53	3.43	3.37	3.09	2.22	1.77	1.13	1.17	25.46
Walnuts	0.73	1.33	2.37	2.16	2.76	5.52	7.27	6.02	4.58	3.14	1.19	1.17	38.26
Misc. Deciduous	0.73	1.34	2.70	2.93	4.31	6.05	6.24	5.10	3.97	3.10	1.24	1.17	38.87
Grain and Grain Hay	0.93	1.38	3.07	5.59	3.26	0.09	0.00	0.01	0.03	1.07	1.00	1.47	17.89
Safflower and Sunflower	0.79	1.37	2.79	5.20	7.05	6.44	1.21	0.01	0.03	0.34	0.98	1.18	27.37
Com and Grain Sorghum	0.74	1.37	2.52	1.86	1.56	5.98	8.13	5.59	0.61	0.34	0.98	1.18	30.85
Misc. field crops	0.74	1.37	2.54	2.66	5.02	6.59	6.73	2.09	0.03	0.34	0.98	1.18	30.26
Alfalfa Hay and Clover	1.00	1.38	3.08	5.64	5.56	6.06	6.17	5.56	4.03	1.75	1.19	1.71	43.14
Pasture and Misc. Grasses	0.74	1.38	3.00	4.74	6.14	6.62	6.88	5.76	4.38	3.34	1.30	1.18	45.47
Small Vegetables	0.74	1.38	3.01	3.35	4.05	6.82	2.70	0.01	0.03	0.34	0.98	1.18	24.58
Tomatoes and Peppers	0.74	1.37	2.65	3.47	6.40	7.25	7.42	2.35	0.03	0.34	0.98	1.18	34.18
Potatoes, Sugar beets, Turnips etc.	0.77	1.37	2.59	1.86	1.24	3.83	6.86	6.62	5.08	3.90	1.38	1.59	37.09
Melons, Squash, and Cucumbers	0.74	1.37	2.53	3.33	6.35	6.82	3.31	0.01	0.03	0.34	0.98	1.18	26.99
Onions and Garlic	0.88	1.38	2.99	4.95	5.57	1.48	0.00	0.01	0.03	0.34	1.28	1.36	20.26
Citrus (no ground cover)	0.98	1.34	3.01	4.50	4.51	4.87	4.90	4.08	3.24	2.46	1.23	1.74	36.87
Immature Citrus	0.86	1.35	2.85	2.92	2.40	2.68	2.67	2.35	1.50	1.70	1.10	1.47	23.84
Avocado	0.73	1.34	2.70	2.93	4.31	6.05	6.24	5.10	3.97	3.10	1.24	1.17	38.87
Grape with 40% cover	0.73	1.34	2.55	2.74	2.58	2.69	2.60	1.67	0.89	0.36	0.94	1.17	20.26
Grape with cover crop	0.88	1.35	2.86	3.42	3.42	3.48	3.63	2.57	1.81	1.40	1.09	1.50	27.42
Grape with 60% cover	0.73	1.34	2.55	3.26	3.78	3.97	3.93	2.41	1.23	0.36	0.94	1.17	25.67
Idle	0.75	1.39	2.39	1.38	0.20	0.09	0.00	0.01	0.03	0.34	0.99	1.18	8.74

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Zone 9 Monthly Evapotranspiration

Surface Irrigation Dry Year

Precipitation

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and reduced vigor

Apple, Pear, Cherry, Plum and Prune Apples, Pluns, Cherries etc w/covercrop
Peach, Nectarine and Apricots
Immature Peaches, Nectarines, etc
Walnuts
Mise. Deciduous
Grain and Grain Hay
Safflower and Sunflower
Corn and Grain Sorghum
Misc. field crops
Alfalfa Hay and Clover
Pasture and Misc. Grasses
Small Vegetables
Tomatoes and Peppers
Potatoes, Sugar beets, Turnips etc.
Melons, Squash, and Cucumbers
Onions and Garlic
Citrus (no ground cover)
Immature Citrus
Avocado
Idle

	Decemb	inches	00.0	3.20	00.00	1.66	0.00	00.0	0.00	00.00	1.09	0.00	00.00	00.0	3.24	0.01	1.19	00.00	2.78	0.00	0.94	2.28	1.22	00.00	0.00
	November	inches	0.00	2.83	0.00	2.03	0.00	0.00	1.16	1.19	0.19	0.00	0.00	0.00	2.50	2.26	0.00	0.00	3.15	0.00	0.77	1.60	0.76	1.19	0.00
	October	inches	00'0	5.07	3.44	4.29	3.84	2.04	4.12	4.16	0.77	0.00	0.00	0.00	2.11	4.82	0.00	0.00	5.71	0.00	0.00	3.09	1.46	4.16	0.00
	September	inches	0.00	4.81	4.10	5.10	4.07	1.90	4.68	3.81	0.00	0.00	0.64	0.00	4.28	4.52	0.00	0.00	5.38	0.00	0.00	2.82	1.48	3.81	0.00
· Y ear)	August	inches	0.00	6.85	5.80	7.41	5.72	2.92	6.72	5.73	0.00	0.00	6.27	2.46	6.33	6.50	0.00	2.29	7.66	0.00	0.00	4.20	2.06	5.73	0.00
(Dry	July	inches	0.00	6.83	5.91	7.44	5.82	2.94	6.56	5.50	0.00	1.41	7.51	6.30	6.21	6.46	2.19	6.97	6.65	2.75	0.00	4.06	1.96	5.50	0.00
	June	inches	0.53	5.61	4.76	6.18	5.02	2.82	4.89	4.85	0.55	5.34	5.14	5.47	5.55	5.47	5.83	6.03	3.59	5.66	2.11	3.75	2.14	4.85	0.53
	May	inches	0.26	4.69	2.36	4.45	3.01	1.59	2.17	3.24	2.77	5.18	1.41	3.65	4.48	4.61	2.87	4.72	1.12	4.69	4.22	3.27	1.64	3.24	0.35
	April	inches	2.54	3.60	2.96	4.33	2.99	2.64	2.82	3.21	4.13	3.96	2.61	2.94	4.20	3.94	3.43	3.27	2.62	3.16	3.88	4.03	3.14	3.21	2.29
	March	inches	1.91	2.90	2.09	2.71	2.09	1.95	1.81	2.55	3.39	2.40	2.76	2.04	3.36	2.89	3.03	2.22	2.10	2.04	3.10	3.04	2.60	2.55	1.82
	February	inches	1.55	2.49	1.66	2.31	1.66	1.65	1.66	1.66	2.89	1.94	1.64	2.12	2.81	2.29	2.37	1.64	1.64	2.15	2.69	2.86	2.24	1.66	1.64
	January	inches	2.25	2.30	0.67	0.95	0.67	0.67	0.67	0.67	2.04	1.28	0.66	0.66	2.40	0.67	0.94	0.66	0.70	0.66	1.60	1.92	1.58	0.67	0.66

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ETc Table for Irrigation Scheduling and Design Zone 10 Monthly Evapotranspiration

Surface Irrigation Dry Y ear IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for b are gots and red uced vigor

1999 (Dry Y ear)

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	January	February	March	April	May	June	July	August	September	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	1.84	1.82	3.34	1.45	0.32	0.02	0.00	0.04	0.02	0.00	0.92	0.09	9.86
Grass Reference ETo	1.78	2.16	3.19	4.62	5.65	6.14	6.56	5.75	4.19	3.94	2.06	2.21	48.25
Apple, Pear, Cherry, Plum and Prune	0.79	1.67	2.22	3.24	4.91	5.88	6.09	5.26	3.72	2.18	0.81	0.18	36.95
Apples, Plums, Cherries etc w/covercrop	1.72	2.58	3.59	4.81	6.20	6.88	7.47	6.50	4.61	3.35	1.92	1.60	51.22
Peach, Nectarine and Apricots	0.79	1.67	2.19	3.08	4.73	5.76	6.15	5.33	3.73	1.92	0.81	0.18	36.33
Immature Peaches, Nectarines, etc	0.79	1.67	2.12	2.24	2.95	3.39	3.76	3.18	2.23	1.13	0.81	0.18	24.46
Almonds	0.79	1.67	2.39	3.66	4.87	5.70	5.82	5.02	3.56	1.89	0.81	0.18	36.36
Almonds w/covercrop	1.44	2.46	3.50	4.90	5.87	6.29	6.91	6.02	3.80	3.07	1.79	1.27	47.33
Immature Almonds	0.79	1.67	2.28	2.61	3.67	3.92	4.21	3.65	2.57	1.53	0.81	0.18	27.89
Walnuts	0.79	1.67	2.27	2.71	4.64	6.65	7.02	6.13	4.14	2.43	0.85	0.18	39.49
Pistachio	0.79	1.67	2.03	2.15	2.22	4.44	6.85	6.03	3.89	2.57	96.0	0.18	33.80
Pistachio w/ covercrop	1.53	2.52	3.26	4.16	4.33	5.98	7.37	6.39	4.60	3.60	2.03	1.45	47.23
Immature Pistachio	0.79	1.67	2.04	1.77	1.30	3.05	4.47	4.19	2.70	1.58	1.00	0.19	24.75
Misc. Deciduous	0.79	1.67	2.22	3.17	4.74	5.56	5.74	5.12	3.56	2.08	0.81	0.18	35.63
Grain and Grain Hay	1.02	2.48	3.69	5.16	3.15	0.03	0.00	0.04	0.02	0.00	1.30	0.46	17.35
Rice	0.80	1.68	2.07	1.77	5.63	7.37	8.01	6.98	2.26	0.00	0.81	0.18	37.56
Cotton	0.80	1.68	2.06	2.02	1.20	3.54	6.92	6.26	4.13	1.36	0.80	0.18	30.96
Safflower and Sunflower	1.24	1.92	2.57	4.84	6.47	6.27	0.94	0.04	0.02	0.00	0.81	0.18	25.31
Corn and Grain Sorghum	0.80	1.68	3.09	1.81	2.24	5.33	6.76	4.32	0.33	0.00	0.81	0.18	27.35
Misc. field crops	0.80	1.68	3.09	1.81	2.16	5.83	6.18	2.28	0.02	0.00	0.81	0.18	24.83
Alfalfa Hay and Clover	1.86	2.48	3.66	5.23	5.26	5.63	5.91	5.45	3.81	1.75	1.95	2.29	45.28
Pasture and Misc. Grasses	0.80	2.19	2.99	4.27	5.61	6.09	6.49	5.65	4.12	3.08	1.30	0.19	42.78
Small Vegetables	1.81	2.10	3.20	4.94	1.87	0.02	0.00	1.02	1.15	0.78	1.87	2.26	21.03
Tomatoes and Peppers	0.80	1.68	2.35	1.89	3.03	6.35	5.78	0.49	0.02	0.00	0.81	0.18	23.37
Potatoes, Sugar beets, Turnips etc.	1.50	1.93	2.73	5.07	6.31	6.77	6.12	0.11	0.02	0.00	0.81	0.18	31.55
Melons, Squash, and Cucumbers	0.80	1.68	2.06	1.38	1.08	0.79	4.00	4.69	1.13	0.00	0.81	0.18	18.59
Onions and Garlic	1.02	2.38	3.42	4.44	4.13	0.98	0.00	0.04	0.02	0.00	1.55	0.52	18.50
Citrus (no ground cover)	1.70	2.57	3.39	4.36	4.24	4.27	4.38	4.01	2.79	2.87	2.05	1.85	38.48
Immature Citrus	1.16	2.16	2.72	2.89	2.73	2.62	2.59	2.29	1.91	1.54	1.42	1.34	25.36
Avocado	0.79	1.67	2.22	3.17	4.74	5.56	5.74	5.12	3.56	2.08	0.81	0.18	35.63
Idle	0.80	1.68	2.07	1.38	0.34	0.02	0.00	0.04	0.02	0.00	0.81	0.18	7.34

ETc Table 34. Zone 12 Dry Year

ETc Table for Irrigation Scheduling and Design Zone 12 Monthly Evapotranspiration Surface Irrigation Dry Year

Surface Irrigation Dry Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare spots and reduced vigor

1999 (Dry Year)

	January	February	March	April	May	June	July	August	September	October	Novemb er	December	Annual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
Precipitation	2.37	3.87	1.46	1.15	0.11	0.20	0.00	0.02	0.23	0.15	1.79	0.17	11.51
Grass Reference ETo	0.77	1.24	2.78	5.34	7.14	7.23	7.73	6.38	5.23	3.62	1.26	1.36	50.07
Apple, Pear, Cherry, Plum and Prune	0.69	1.43	2.09	3.55	6.19	6.80	7.38	5.93	4.78	2.08	0.94	0.82	42.69
Apples, Plums, Cherries etc w/covercrop	0.87	1.43	3.30	5.50	7.69	8.30	8.87	7.21	5.77	333	1.23	1.48	54.97
Peach, Nectarine and Apricots	0.69	1.43	2.09	3.34	6.03	6.79	7.16	6.00	4.79	2.14	0.94	0.82	42.23
Immature Peaches, Nectannes, etc	0.70	1.44	1.96	2.30	3.72	4.05	4.47	3.64	2.97	122	0.95	0.82	28.24
Almonds	0.69	1.43	2.29	4.11	6.26	6.44	7.05	5.63	4.69	2.68	0.97	0.82	43.05
Almonds w/covercrop	0.86	1.43	3.22	5.58	7.52	7.54	8.06	6.70	5.33	3.02	1.17	1.43	51.86
Immature Almonds	0.70	1.44	2.12	5.99	4.66	4.70	4.98	4.14	6E°E	1.79	1.02	0.82	32.75
Walnuts	0.69	1.42	2.18	2.89	5.81	7.97	8.38	6.87	5.16	2.47	1.00	0.82	45.66
Pistachio	0.69	1.43	1.84	2.17	2.53	5.68	7.92	6.71	5.22	239	1.00	0.82	38.41
Pistachio w/ covercrop	0.86	1.43	3.21	4.56	5.27	7.33	8.69	7.27	5.83	351	1.26	1.51	50.72
Immature Pistachio	0.70	1.44	1.83	1.71	1.44	3.81	5.50	4.48	3.64	141	0.97	0.82	27.75
Misc. Deciduous	0.69	1.43	2.09	3.46	5.87	6.51	6.90	5.78	4.50	2.25	0.94	0.82	41.25
Grain and Grain Hay	0.76	1.48	3.24	5.94	3.51	0.21	0.00	0.02	0.23	0.11	0.98	0.92	17.39
Rice	0.72	1.48	1.82	1.81	7.23	8.74	9.44	7.75	2.64	0.11	0.98	0.81	43.51
Cotton	0.71	1.48	1.81	1.94	1.47	4.52	8.20	6.88	5.19	132	0.98	0.80	35.30
Safilower and Sunflower	0.77	1.48	2.49	20.2	8.18	7.68	1.48	0.02	0.23	0.11	86.0	0.81	29.87
Corn and Grain Sorghum	0.71	1.48	2.43	2.01	2.55	6.69	7.84	4.80	0.62	0.11	86.0	0.80	31.01
Misc. field crops	0.71	1.48	2.43	2.01	2.61	6.82	7.43	2.57	0.24	0.11	0.98	0.80	28.19
Alfalfa Hay and Clover	0.88	1.47	3.22	6.12	6.56	6.75	6.86	6.03	4.79	1.68	1.24	1.53	47.14
Pasture and Misc. Grasses	0.72	1.48	16.2	2.07	20.7	7.18	7.59	6.32	6T'S	2.77	1.19	0.81	48.28
Small Vegetables	0.86	1.48	2.98	5.82	1.84	0.20	0.00	1.03	1.50	0.72	1.18	1.47	19.07
Tomatoes and Peppers	0.71	1.48	2.37	1.87	3.95	7.65	6.72	0.43	0.24	0.11	0.98	0.80	27.31
Potatoes, Sugar beets, Turnips etc.	0.85	1.48	2.66	5.90	7.99	8.00	7.24	0.09	0.24	0.11	0.98	0.80	36.34
Melons, Squash, and Cucumbers	0.71	1.48	1.81	1.25	0.89	1.41	4.70	5.27	1.63	0.11	0.98	0.80	21.04
Onions and Garlic	0.77	1.48	3.05	5.00	4.98	0.85	0.00	0.02	0.24	0.11	1.39	0.99	18.87
Citrus (no ground cover)	0.87	1.43	3.26	4.78	5.08	5.16	5.33	4.46	3.75	2.52	1.25	1.54	39.42
Immature Citrus	0.79	1.44	2.67	3.29	2.96	3.19	3.37	2.72	2.25	101	1.13	1.23	26.63
Avocado	0.69	1.43	2.09	3.46	5.87	6.51	6.90	5.78	4.50	2.25	0.94	0.82	41.25
Grape Vines with 80% canopy	0.70	1.44	1.92	2.17	3.45	5.68	5.84	4.59	2.96	0.11	0.95	0.82	30.64
Grape Vines with cover crop (80% canopy)	0.84	1.44	3.06	4.04	5.19	6.38	7.02	5.27	3.47	1.56	1.05	1.28	40.60
Immature Grapes Vines with 50% canopy	0.70	1.45	1.89	1.85	2.23	4.07	4.39	3.21	2.00	0.19	0.96	0.81	23.74
Idle	0.72	1.49	1.81	1.25	0.11	0.20	0.00	0.02	0.23	0.11	0.99	0.80	7.73

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ETc Table for Irrigation Scheduling and Design

Zone 13 Monthly Evapotranspiration Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for hare spots and reduced vigor

	inches												
Precipitation	4.67	7.74	1.95	1.59	0.75	0.35	0.00	0.19	0.00	1.64	2.86	0.45	22.19
Grass Reference ETo	1.21	1.46	3.09	4.70	6.81	7.64	9.00	7.17	5.97	4.10	1.80	1.28	54.24
Apple, Pear, Cherry, Plum and Prune	0.69	1.72	2.13	2.38	3.90	6.62	8.65	6.78	5.43	3.76	1.78	0.95	44.80
Apples, Plums, Cherries etc w/covercrop	1.37	1.75	3.58	4.77	6.90	8.84	10.58	8.38	6.94	4.23	2.20	1.53	61.06
Almonds	0.69	1.72	2.13	2.32	3.49	5.99	8.08	6.56	5.41	3.69	2.04	0.95	43.07
Almonds w/covercrop	1.25	1.75	3.29	4.10	5.93	7.53	9.64	7.73	6.35	4.08	2.13	1.46	55.24
Immature Almonds	0.69	1.72	2.04	2.07	2.51	4.56	5.68	4.70	4.01	2.68	1.90	0.95	33.50
Walnuts	0.69	1.72	2.04	2.45	3.51	6.00	9.65	7.82	6.19	3.85	2.06	0.95	46.92
Pistachio	0.69	1.72	1.87	2.37	2.84	5.51	9.24	7.81	6.31	3.95	2.06	0.95	45.31
Pistachio w/ covercrop	1.25	1.75	3.29	4.15	5.53	7.45	10.29	8.46	7.07	4.62	2.21	1.48	57.55
Immature Pistachio	0.69	1.72	1.87	1.99	1.80	3.94	6.14	5.27	4.23	2.87	1.88	0.95	33.34
Misc. Deciduous	0.69	1.72	1.87	2.18	2.61	5.31	8.37	6.80	5.59	3.75	1.83	0.95	41.67
Grain and Grain Hay	0.85	1.75	3.61	5.28	3.60	0.37	0.00	0.19	0.00	0.68	1.61	1.06	18.99
Rice	0.68	1.72	1.86	2.01	7.54	9.35	11.14	8.86	2.66	0.68	1.61	0.95	49.08
Cotton	0.68	1.72	2.42	1.85	2.20	6.60	9.61	7.27	1.67	0.68	1.61	0.95	37.27
Corn and Grain Sorghum	0.68	1.72	1.91	2.06	3.36	7.69	9.72	6.88	0.92	0.67	1.61	0.95	38.18
Misc. field crops	0.68	1.72	1.91	2.06	3.23	7.38	8.78	2.85	0.00	0.68	1.61	0.95	31.87
Alfalfa Hay and Clover	1.34	1.75	3.51	5.39	6.66	7.32	8.08	6.95	5.38	2.29	2.03	1.47	52.16
Pasture and Misc. Grasses	0.68	1.73	2.93	4.52	6.99	7.73	9.01	7.25	5.88	3.64	1.96	0.95	53.29
Small Vegetables	1.10	1.74	3.26	1.80	0.70	0.35	0.00	1.15	1.46	1.69	1.97	1.40	16.61
Tomatoes and Peppers	0.68	1.72	2.14	2.17	4.52	8.18	8.21	0.73	0.00	0.68	1.61	0.95	31.60
Misc Subtropical	0.69	1.72	1.87	2.18	2.61	5.31	8.37	6.80	5.59	3.75	1.83	0.95	41.67
Grape Vines with 80% canopy	0.69	1.72	2.13	2.56	4.52	5.99	6.58	5.10	2.97	0.68	1.62	0.95	35.52
Grape Vines with cover crop (80% canopy)	1.15	1.75	3.07	3.88	5.44	6.84	7.69	6.07	3.63	2.01	1.90	1.34	44.77
Immature Grapes Vines with 50% canopy	0.69	1.72	2.04	2.20	3.22	4.74	4.96	3.83	2.06	0.72	1.62	0.95	28.74
Idle	0.68	1.72	1.85	1.60	0.70	0.35	0.00	0.19	0.00	0.68	1.61	0.95	10.34

July August September October November December Annual

1999 (Dry Y ear)

June

May

April

January February March

ETc Table 36. Zone 14 Dry Year

ETc Table for Irrigation Scheduling and Design Zone 14 Monthly Evapotranspiration

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Apple, Pear, Cherry, Plum and Prune
Apples, Plums, Chernes etc w/covercrop
Peach, Nectarine and Apricots Immabure Peaches, Nectarines, etc
Almonds
Almonds w/covercrop
Immature Almonds
Walnuts
Pistachio
Pistachio w/ covercrop
Immature Pistachio
Misc. Deciduous
Grain and Grain Hay
Rice
Cotton
Safflower and Sunflower
Corn and Grain Sorghum
Misc. field crops
Alfalfa Hay and Clover
Pasture and Misc. Grasses
Small Vegetables
Tomatoes and Peppers
Potatoes, Sugar beets, Turmps etc.
Melons, Squash, and Cucumbers
Onions and Garlic
Citrus (no ground cover)
Immature Citrus
Avocado
Grape Vines with 80% canopy
Grape Vines with cover crop (80% canopy)
Immature Grapes Vines with 50% canopy
Idle

						(DD)	(Year)			
January	February	March	April	May	June	July	August	S eptemb er	October	Noven
inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inche
2.56	4.69	1.34	1.01	0.10	0.26	0.13	0.05	0.04	0.47	2.14
0.83	1.35	2.97	5.67	7.31	7.59	8.18	6.78	5.61	4.14	1.4:
0.76	1.58	2.21	3.57	6.57	7.38	8.01	6.54	2.10	2.90	1.1
0.97	1.59	3.57	5.74	8.00	9.01	9.73	7.92	6.24	3.87	1.4
0.76	1.58	2.22	3.34	6.36	7.44	7.90	6.53	5.14	2.66	1.1
0.76	1.59	2.07	2.23	3.92	4.73	5.02	3.99	3.09	1.76	1.1
0.76	1.58	2.37	4.09	6.58	7.07	7.60	6.32	4.88	2.75	1.1
0.94	1.59	3.46	5.85	7.75	8.26	8.84	7.30	5.49	3.32	1.4
0.76	1.59	2.21	2.98	6.4	5.29	5.75	4.44	3.52	1.84	1.1
0.76	1.58	2.31	2.84	6.06	8.59	9.16	7.60	5.52	3.04	1.2
0.76	1.58	1.92	2.06	2.58	6.16	8.77	7.14	5.52	3.04	1.2
0.94	1.59	3.45	4.69	5.54	7.81	9.42	7.87	6.40	4.11	1.5
0.76	1.59	1.91	1.57	1.48	4.15	6.19	4.95	3.70	2.15	1.1
0.76	1.58	2.21	3.47	6.23	7.07	7.73	6.26	4.99	2.71	1.1
0.81	1.61	3.46	6.36	4.04	0.28	0.15	0.05	0.04	0.35	1.1
0.76	1.60	1.90	1.67	7.41	9.28	10.13	8.34	2.38	95.0	1.1
0.76	1.60	1.90	1.83	1.58	4.92	8.73	7.41	2.66	2.11	1.1
0.82	1.61	2.69	5.93	8.43	7.57	1.21	0.05	0.04	0.35	1.1
0.76	1.60	2.36	1.93	2.70	7.10	8.47	5.15	0.36	0.35	1.1
0.76	1.60	2.36	1.93	2.64	7.32	8.07	2.28	0.04	0.35	1.1
0.96	1.61	3.41	6.40	6.70	7.11	7.41	6.43	5.18	1.99	1.4
0.76	1.60	3.08	5.33	7.24	7.69	8.20	6.74	5.53	3.62	1.4
0.93	1.61	3.22	6.23	1.74	0.27	0.15	1.07	1.60	1.24	1.4
0.76	1.60	2.47	1.71	4.08	8.21	7.04	0.51	0.04	0.35	1.1
0.90	1.61	2.88	6.27	8.14	8.54	21.8	0.16	0.04	95.0	1.1
0.76	1.60	1.90	1.09	0.89	1.51	5.21	5.48	1.85	0.35	1.1
0.81	1.61	3.26	5.31	4.63	0.75	0.15	0.05	0.04	0.35	1.5
0.96	1.59	3.51	5.13	5.31	5.73	5.97	4.81	4.10	3.25	1.5
0.85	1.60	2.81	3.44	3.24	3.66	3.71	3.13	2.52	1.94	51
0.76	1.58	2.21	3.47	6.23	7.07	7.73	6.26	4.99	2.71	1.1
0.76	1.59	2.03	2.07	3.59	6.14	6.68	4.93	3.04	10.37	1.1

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22.60 19.62

ETc Table for Irrigation Scheduling and Design Zone 15 Monthly Evapotranspiration

Surface Irrigation Dry Year IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare gots and reduced vgor

Precipitation	2.35	1.00
Grass Reference ETo	0.90	1.77
Apple, Pear, Cherry, Plum and Prune	0.67	1.36
Apples, Plums, Chernes etc w/covercrop	0.78	1.89
Peach, Nectarine and Apricots	0.67	1.36
Immature Peaches, Nectarines, etc	0.67	1.37
Almonds	0.67	1.56
Almonds w/covercrop	0.89	1.98
Immature Almonds	0.67	1. 14
Walnuts	0.67	1.36
Pistachio	0.67	1.36
Pistachio w/ covercrop	0.95	1.99
Immature Pistachio	0.67	1.37
Mise. Deciduous	0.67	1.36
Grain and Grain Hay	0.79	2.02
Rice	0.70	1.39
Cotton	0.70	1.39
Safflower and Sunflower	0.91	1.57
Corn and Grain Sorghum	0.70	1.39
Misc. field crops	0.70	1.39
Alfalfa Hay and Clover	1.02	2.01
Pasture and Misc. Grasses	0.70	1.96
Small Vegetables	0.93	1.73
Tomatoes and Peppers	0.70	1.39
Potatoes, Sugar beets, Turmps etc.	1.00	1.58
Melons, Squash, and Cucumbers	0.70	1.39
Onions and Garlic	0.78	1.95
Citrus (no ground cover)	0.99	2.01
Immature Citrus	0.83	1.74
Misc Subtropical	0.67	1.36
Grape Vines with 80% canopy	0.67	1.37
Grape Vines with cover crop (80% canopy)	0.77	1.77
Immature Grapes Vines with 50% canopy	0.68	1.37
Idle	0.71	1.40

nd reduced vig	or					999 (Dry	Year)					
January	February	March	April	May	June	July	August	September	October	November	December	Annual
inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
2.35	1.06	1.85	0.57	0.05	0.00	0.01	0.00	0.03	0.00	0.33	0.11	6.35
0.90	1.77	3.40	5.27	7.74	8.10	8.47	7.34	5.84	4.09	1.82	1.53	56.27
0.67	1.36	2.21	3.63	6.97	7.34	7.83	6.80	5.14	2.30	0.27	0.15	44.65
0.78	1.89	4.00	5.27	8.34	9.01	9.47	8.36	6.17	3.14	0.95	0.65	58.03
0.67	1.36	2.05	2.70	6.44	7.43	7.88	6.92	5.20	2.21	0.27	0.15	43.27
0.67	1.37	1.87	1.71	4.20	4.84	5.27	4.35	3.28	1.37	0.28	0.15	29.36
0.67	1.56	2.52	4.00	6.63	6.54	6.92	6.59	4.40	2.30	0.27	0.15	42.55
0.89	1.98	3.39	5.22	7.48	7.87	8.40	7.15	4.89	2.93	1.16	0.88	52.23
0.67	1.46	2.18	3.36	5.50	5.59	6.03	5.25	3.58	1.62	0.28	0.15	35.66
0.67	1.36	2.31	2.84	7.32	9.03	9.54	8.27	5.73	2.67	0.37	0.15	50.26
0.67	1.36	1.69	1.70	2.73	6.37	8.95	7.73	5.94	2.82	0.31	0.15	40.40
0.95	1.99	3.36	4.18	5.67	8.05	9.76	8.45	6.68	3.90	1.24	0.91	55.13
0.67	1.37	1.69	1.08	1.65	4.20	6.29	5.50	3.97	1.74	0.34	0.15	28.66
0.67	1.36	2.36	3.43	6.58	7.07	7.54	6.30	5.10	2.16	0.27	0.15	42.98
0.70	2.02	3.86	5.75	3.97	0.01	0.01	0.00	0.03	0.00	0.85	0.40	17.71
0.70	1.39	1.68	1.36	7.66	9.87	10.55	9.06	2.62	0.00	0.28	0.15	45.30
0.70	1.39	1.68	1.37	1.66	5.05	9.02	8.08	5.83	1.26	0.28	0.15	36.45
0.91	1.57	2.53	5.46	9.05	7.79	0.73	0.00	0.03	0.00	0.28	0.15	28.51
0.70	1.39	2.67	1.67	2.77	7.52	8.99	5.43	0.37	0.00	0.28	0.15	31.92
0.70	1.39	2.67	1.67	2.74	7.85	8.34	2.73	0.03	0.00	0.28	0.15	28.54
1.02	2.01	3.87	5.65	7.10	7.44	7.65	6.77	5.20	1.80	1.56	1.57	51.65
0.70	1.96	3.13	4.76	7.70	8.15	8.46	7.44	5.80	3.27	0.75	0.15	52.28
0.93	1.73	3.36	5.67	1.82	0.00	0.01	1.04	1.35	86.0	1.46	1.53	19.89
0.70	1.39	2.21	1.26	4.36	8.73	7.47	0.47	0.03	0.00	0.28	0.15	27.03
1.00	1.58	2.79	5.77	8.74	9.05	8.06	0.07	0.03	0.00	0.28	0.15	37.52
0.70	1.39	1.68	0.64	0.84	1.26	5.38	6.12	U.70	0.00	0.28	0.15	20.23
0.78	1.95	3.51	4.81	5.13	0.79	0.02	00'0	0.03	0.00	1.03	0.38	18.42
0.09	2.01	3.72	4.66	5.63	5.94	6.15	5.31	4.I9	3.03	1.43	1.36	44.44
0.83	1.74	2.70	3.00	3.47	3.71	3.90	3.25	2.75	1.76	1.02	0.76	28.89
0.67	1.36	2.36	3.43	6.58	7.07	7.54	6.30	5.10	2.16	0.27	0.15	42.98
0.67	1.37	2.01	1.81	4.26	6.19	6.64	4.89	3.10	0.00	0.27	0.15	31.38
0.77	1.77	3.15	3.60	5.65	6.91	7.49	5.98	3.58	1.52	0.79	0.55	41.77
0.68	1.37	1.86	1.38	3.23	4.61	5.18	3.66	2.26	0.01	0.27	0.15	24.66
0.71	1.40	1.68	0.65	0.05	0.00	0.01	0.00	0.03	0.00	0.28	0.15	4.95

ETc Table 38. Zone 16 Dry Year

ETc Table for Irrigation Scheduling and Design Zone 16 Monthly Evapotranspiration

Surface Irrigation Dry Y ear IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include adjustments for bare spots and reduced vigor

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1999 (Dry Year)

	January	February	March	April	May	June	July	August	September	October	November	December	Amual
	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
	2.33	0.76	2.11	1.49	0.05	0.06	0.00	0.00	0.11	0.43	0.08	0.22	7.63
	0.82	1.90	3.55	5.51	7.98	8.32	8.75	7.41	6.10	4.45	2.10	1.55	58.44
	0.51	1.03	2.18	4.95	7.23	7.61	8.15	6.97	5.26	2.85	0.10	0.19	47.05
rop	0.71	1.97	4.23	6.42	89.68	9.48	9.82	8.48	6.62	3.92	1.51	0.92	62.75
	0.51	1.03	1.83	4.20	6.67	7.67	8.22	6.79	5.55	2.69	0.10	0.19	45.46
	0.52	1.04	1.67	3.11	4.19	5.29	5.29	4.51	3.48	1.90	0.10	0.19	31.29
	0.51	1.31	2.28	5.50	6.65	6.81	7.28	6.64	4 .7	2.71	0.10	0.19	4 .7
	0.67	1.95	3.31	6.18	7.95	7.89	8.75	7.05	5.71	2.66	0.96	0.64	53.71
	0.52	1.15	1.97	4.68	5.65	5.90	6.37	5.23	3.75	2.14	0.10	0.19	37.65
	0.51	1.03	2.34	4.33	7.54	9.40	9.90	8.43	6.03	3.23	0.18	0.19	53.13
	0.51	1.03	1.52	2.96	2.80	6.52	9.38	7.95	6.13	3.30	0.25	0.19	42.56
	0.75	1.97	3.00	5.41	5.89	8.39	10.21	8.72	6.93	4.39	1.27	0.78	57.71
	0.52	1.04	1.52	2.49	1.68	4.36	6.47	5.57	4.23	2.19	0.15	0.19	30.40
	0.51	1.03	2.18	4.71	6.99	7.24	7.73	6.64	5.18	2.83	0.10	0.19	45.34
	0.64	2.09	3.95	6.22	4.05	0.07	0.00	0.00	0.12	0.40	0.76	0.40	18.69
	0.53	1.04	1.50	2.43	1.74	5.21	9.33	8.15	6.22	2.13	0.11	0.19	38.57
	0.86	1.26	2.37	6.08	9.34	8.06	0.75	0.00	0.12	0.40	0.10	0.19	29.54
	0.53	1.04	2.65	2.83	2.90	7.70	9.23	5.22	0.44	0.40	0.10	0.19	33.24
	0.53	1.04	2.65	2.83	2.83	8.09	8.70	2.83	0.14	0.40	0.10	0.19	30.32
	06.0	2.08	4.02	6.22	7.34	7.67	7.85	6.93	5.51	2.25	1.76	1.64	54.17
	0.53	1.58	2.89	5.67	7.96	8.36	8.82	7.48	6.07	3.87	0.65	0.19	54.07
	0.81	1.52	3.55	6.06	1.65	0.06	0.00	1.01	1.46	1.57	1.57	1.58	20.83
	0.53	1.04	2.05	2.63	4.50	9.02	8.31	0.64	0.14	0.40	0.10	0.19	29.55
	0.92	1.31	2.70	6.28	9.05	9.47	8.17	0.06	0.14	0.40	0.10	0.19	38.78
	0.53	1.04	1.50	2.03	0.85	1.45	5.54	6.17	2.05	0.40	0.10	0.19	21.84
	0.63	1.95	3.53	5.38	5.26	0.82	0.00	0.00	0.12	0.40	0.84	0.47	19.39
	0.80	2.05	3.61	5.89	5.89	6.06	6.34	5.36	4.44	3.66	1.72	1.25	47.16
	0.68	1.56	2.58	4.26	3.64	3.76	4.00	3.43	2.86	2.30	0.95	0.76	30.78
	0.51	1.03	2.18	4.71	6.99	7.24	7.73	6.64	5.18	2.83	01.0	0.19	45.34
	0.52	1.04	1.86	3.19	4.51	6.38	6.77	5.08	3.20	0.40	0.10	0.19	33.23
anopy)	0.58	1.65	3.09	4.99	5.96	7.09	7.81	5.96	3.84	2.11	0.76	0.54	44.37
topy	0.52	1.04	1.67	2.79	3.29	4.78	5.39	3.68	2.36	0.46	0.10	0.19	26.27
	0.54	1.04	1.49	2.03	0.06	0.06	0.00	0.00	0.12	0.39	0.10	0.19	6.02

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ETc Table for Irrigation Scheduling and Design

Zone 18 Monthly Evapotranspiration Surface Irrigation Dry Year

IRRIGATION TRAINING AND RESEARCH CENTER, California Polytechnic State University, San Luis Obispo Table does not include ad justments for b are spots and red uced vigor

Precipitation	0.04	0.21	0.06	0.29	0.05	0.01	0.33	0.05	0.36
Grass Reference ETo	3.02	3.50	5.79	6.88	8.87	9.17	9.09	8.83	6.58
Peach, Nectarine and Apricots	0.06	0.22	2.33	3.98	8.08	9.78	9.56	9.40	6.87
Grain and Grain Hay	1.45	3.69	6.60	69.69	62.0	0.01	0:30	60'0	0.32
Cotton	0.05	0.22	1.00	1.71	2.47	7.95	10.50	10.24	7.17
Safflower and Sunflower	0.93	0.71	2.17	7.12	10.52	9.16	1.20	0.09	0.32
Corn and Grain Sorghum	1.00	1.17	5.25	8.34	9.99	2.45	0.30	0.09	0.32
Misc. field crops	1.12	1.28	5.19	7.34	5.10	0.02	0:30	0.09	0.32
Alfalfa Hay and Clover	3.14	3.02	5.39	7.29	16.7	8.66	8.43	8.17	6.43
Pasture and Misc. Grasses	0.05	2.17	2.17	4.91	7.86	8.94	8.59	8.42	5.91
Small Vegetables	2.44	2.32	6.02	2.30	0.08	0.01	0.30	0.09	2.36
Tomatoes and Peppers	0.97	0.74	3.69	8.21	10.34	3.79	0.30	0.09	0.32
Potatoes, Sugar beets, Turnips etc.	3.62	4.33	7.15	8.50	8.67	0.10	0.30	0.09	1.28
Melons, Squash, and Cucumbers	0.97	0.70	3.46	7.57	9.61	4.11	0.31	0.09	0.32
Onions and Garlic	3.12	3.67	6.06	6.69	1.96	0.01	0.30	0.09	1.28
Citrus (no ground cover)	2.45	2.54	4.18	5.42	6.86	7.01	7.31	6.95	5.30
Grape Vines with 80% canopy	0.06	0.22	2.33	3.98	8.08	9.78	9.56	9.40	6.87
Idle	0.05	0.22	0.06	0.30	0.06	0.01	0.30	0.09	0.32

<u>Amual</u> inches

> <u>inches</u> 0.04 2.81

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1999 (Dry Y ear)

July inches

June

May inches

April

January February March

inches

inches

inches

August September October November December

1.50

73.70

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0.03 1.34 0.02 0.02 1.341.203.06 0.02 2.73 0.02 2.13 0.02 2.59 2.25 0.03 0.02

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22.03 69.87 51.18 22.43 28.54 37.12

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5.63 2.10 2.02 0.36 0.36 0.39

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Zones
Precipitation,
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Cal Poly ITRC **Evaporation** fi Annual Values by

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		Zone 1			Zone 3			Zone 4			Zone 6			Zone 8			Zone 3	
	1997 (Typ) 1	938 (Wet)	1333 (Dry)	1997 (Typ)	1938 (Wet)	1333 (Dry)	1997 (Typ)	1338 (Wet)	1333 (Dry)	1337 (Typ)	1338 (Wet) 1	1333 (Dry)	1997 (Typ)	1338 (Wet)	1939 (Dry)	1997 (Typ)	1338 (Wet)	333 (Dry)
Crop	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
Apple, Pear, Cherry, Plum and Prune	5	10.7	4.8	6.7	11.4	8.9	7.2	11.8	6.8	9	11.7	7.3	9.2	11.2	8.9	2	9.5	6.8
Apple, Pear, Cherry etc w/cover crop	3.3	5.7	2.9	4.7	6.2	5.1	5	6.8	4	4	7.4	5.4	7.1	5.7	4.8	5.4	6.3	4.8
Immature Apple, Pear, Cherry etc	5	11.1	4.7	7	11.8	9	7.2	12.3	7	9	12	7.5	9.5	11.6	6	6.9	9.9	2
Peach, Nectarine and Apricots	2	10.5	4.9	6.6	10.8	8.3	7.1	11.7	6.9	6.1	11.9	7.4	9.2	11.1	8.9	12	9.4	6.8
Immature Peach, Nectarine and Apricots	5.1	11.2	4.9	6.7	11.2	8.6	7.4	12.2	7	6.2	12.1	7.5	3.6	11.7	9.1	7	9.9	6.9
Almonds	nta	elu	n/a	6.4	10.4	8.1	e/u	ela	e/u	ø	11.6	7.4	8.3	9.8	8.3	ę	e/u	ę
Almonds w/ cover crop	e/a	e/u	nta	5.1	2	5.8	n/a	cha	e/u	4.5	8.7	6.4	1.1	6.5	5.6	chu	e/u	e/u
Immature Almonds	e/u	e/u	nla	6.6	10.9	8.5	e/u	cha	e/u	6.2	12.1	7.4	9.1	10.8	8.6	chu	e/u	e/u
Walnuts	e/u	e/u	nla	6.3	10.5	8.2	6.8	11.6	6.9	5.6	11.9	7.4	8.6	10.5	8.4	6.8	9.3	6.8
Immature Walnuts	e/u	e/u	ala	6.6	11.2	8.5	7.2	12.3	2	9	12.1	7.5	9.3	11.3	8.8	6.9	9.9	-
Pistachio	e/u	e/u	nla	ela	eyu	ela	e/u	e/u	e/u	5.9	12.4	7.6	8.9	11.1	8.7	5.8	8	5.9
Pistachio w/ cover crop	e/u	e/u	ela	ela	eyu	ela	e/u	ela	e/u	1.7	3.4	2.4	7.2	7.2	5.7	4.2	5.3	3.9
Immature Pistachio	e/u	cha	nla	ela	eju	ela	e/u	ela	e/u	6.3	12.5	7.6	3.4	11.5	6	5.6	8.3	5.8
Mise. Deciduous	4.8	10.3	4.8	6.4	10.5	8.2	1.1	11.6	6.9	5.7	11.3	7.2	6	Ħ	8.7	6.9	9.5	6.8
Immature Mise. Deciduous	5.1	11.2	4.9	6.7	11.1	8.5	7.4	12.2	7	5.9	11.5	7.3	9.5	11.6	6	7	9.9	6.9
Grain and Grain Hay	3.3	5.5	2.5	4.8	5.4	3.4	5.6	5.9	1.4	4.5	5.6	2.5	5.4	4.7	3.3	4.6	3.6	1.7
Rice	ela	e/u	nla	ela	ela	ela	nla	elu	e/u	ela	elu	elu	e/a	elu	ela	e/u	e/u	n/a
Cotton	e/u	e/u	ala	ela	ela	ela	e/u	ela	e/u	5.9	11.3	6.9	e/a	ela	e/u	e/u	e/u	e/u
Safflower and Sunflower	e/u	e/u	nla	6.4	8	6.1	e/u	e/u	e/u	6.2	8.5	6.4	6.7	6.3	7.4	6.2	6.4	4.5
Corn and Grain Sorghum	4.7	10.7	3.9	6.4	10.8	3.5	7.2	11.8	6.4	5.9	11.3	6.9	8.5	10.7	1.7	7.2	9.5	6.5
Beans	elu	elu	nla	6.5	9.5	8.1	7.1	10.4	6.5	5.9	0	6.8	8.5	₽	8	6.9	8.6	9
Mise. field crops	4.8	9.5	4.2	6.5	3.5	8.1	ela	cha	e/u	9	10.1	6.8	8.5	9.9	7.9	7	8.7	6.1
Alfalfa Hay and Clover	2.1	4.8	2.1	2.8	4.9	3.9	3.4	5.5	2.9	2	5	3.7	3.1	4.2	3.1	3.5	4.7	3.3
Pasture and Misc. Grasses	4.4	7.6	4.7	5.7	ŵ	r	6.5	9.1	6.2	5.4	8.8	6.4	7.7	7.5	7.1	6.3	7.8	4.9
Small Vegetables (Double Crop)	3.9	6.8	3.2	5.4	6.6	5.1	6.2	7.7	4.1	5.1	7.3	4.8	6.8	6.9	4.9	ç	6.4	4
Tomatoes and Peppers	4.5	9.2	4.2	6.1	9.3	8.2	6.7	10.3	6.5	5.8	₽	6.7	8.3	9.9	8.4	6.9	8.3	5.9
Potatoes, Sugar beets, Turnip etc.	2.9	7.8	с С	4.2	n	6.4	e/u	ela	e/u	3.6	9.5	6.2	6.6	7.9	6.9	4.6	8.7	6.5
Melons, Squash, and Cucumbers	5	3.8	4.6	6.8	9.9	8.6	7.5	10.7	6.9	6.4	10.5	7.2	3.2	10.8	6	7.2	8.9	6.4
Onions and Garlic	4.2	6.6	3.3	5.2	5.6	4.4	5.8	6.2	2.5	4.8	6.1	3.4	6.4	5.5	4.4	5.4	4.6	2.5
Strawberries	5.3	10.9	4.4	6.8	10.5	8.3	7.4	11.4	6.6	6.1	÷	r	8.7	10.3	8.1	7.2	9.3	6.3
Flowers, Nursery and Christmas Tree	2	10.8	4.9	6.7	11.2	8.7	7.3	12.4	7.1	٥	51	7.6	9.8	12.1	9.4	7:2	₽	7.2
Citrus (no ground cover)	3.6	7.3	3.4	5.3	7.4	5.7	5.5	8.4	4.5	4.2	8.3	5.6	7.3	6.9	5.3	5.7	5	5.3
Immature Citrus	4.4	10.1	4.3	6.2	₽	7.6	6.6	10.8	6.2	5.1	10.3	6.7	8.5	10.1	7.6	6.5	8.9	6.4
Avocado	4.8	10.3	4.5	6.6	11.3	8.7	7.1	얻	6.9	9.6	12	0.7	7.7	9.5	7.6	~	9.7	6.9
Mise Subtropical	3.6	7.3	3.4	5.2	7.4	5.6	5.5	8.4	4.5	4.2	8.4	5.8	7.4	r	5.5	5.6	r-	5.2
Grape Vines with 40% canopy	ela	eju	ela	6.8	11.1	8.5	ela	e'n	e/u	5.3	11.5	7.3	9.8	11.8	9.1	ę	ę	ęu
Grape Vines with cover crop (60% canopy)	n/a	e/u	nta	5.7	3.1	6.8	n/a	ela	n/a	4.7	9.9	6.3	8.7	9.7	2	c¦u	e/u	e/u
Grape Vines with 60% canopy	nta	elu	n/a	6.8	Ħ	8.5	n/a	ela	n/a	5.9	11.5	7.2	3.6	11.6	9.1	e¦u	e/u	e¦u
Grape Vines	n/a	elu	ala	n/a	e'n	ela	7.5	5	6.9	elu	ele e	elu	e/u	ela	ela	6.5	8.8	6.4
Grape Vines w/ cover crop	ela	elu	nla	ela	ela	ela	6	10	5.7	ela	elu	elu	e/a	ala	e/u	5.6	7.8	5.7
Immature Grape Vines	nta	ela	ala	e/u	e'n	ela	7.4	12.1	6.9	e/u	ela	-e e	eju	elu	e/u	6.4	9.1	6.5
Idle	4.9	10.9	4.7		11.7	0	7.9	¢	7.4	6.2	12.1	7.4	9.7	11.5	8.8	12	9.9	~
		:			:							:			-	;		
Total Precipitation	18.5	32.8	10.5	13.6	32	13.4	18.5	33.3	11.2	5.6	22.1	6.3	25.1	48.5	13.5	15.6	32.1	n

Cal Poly ITRC											
Annual Values by DWR ETo Zone and Year											
		Zone 10			Zone 12			Zone 13			Ñ
	1997 (Typ)	1338 (Wet)	1333 (Dry)	1997 (Typ)	1338 (Wet)	1939 (Dry)	1997 (Typ)	1338 (Wet)	1333 (Dry)	1997 (Typ)	133
Crop	Inches	-									
Apple, Pear, Cherry, Plum and Prune	6.9	11.9	6.9	5.8	9.6	7.5	7.6	12.3	10.5	6.6	-
Apple, Pear, Cherry etc w/cover crop	4.4	7.5	5	4.3	4.9	4.9	5.5	6.8	6.6	4.7	-
Immature Apple, Pear, Cherry etc	7.2	12.9	1.1	6.1	Ħ	7.6	7.9	13.9	10.6	6.9	-
Peach, Nectarine and Apricots	7.1	얹	6.9	5.6	9.7	7.5	eln	ela	ela	6.5	-
Immature Peach, Nectarine and Apricots	7.4	12.8	7	5.8	10.4	7.5	ela	ela	ela	6.8	
Almonds	6.9	11.9	6.9	5.7	9.3	7.2	7.5	12.4	10.2	6.4	-
Almonds w/ cover crop	5.3	8.8	5.7	4.5	6.1	5.5	6.1	8.7	7.7	5.3	
Immature Almonds	7.3	12.8	1.1	5.9	10.2	7.4	7.7	13.6	10.6	6.8	-
Walnuts	6.7	험	6.9	5.6	3.5	2.5	7.6	12.2	10.2	6.4	-
Immeture Welsute	22	10 A	7 1	£1	÷	76	62	13.8	10.6	6.9	Ē

		Zone 10			Zone 12			Zone 13			Zone 14			Zone 15			Zone 10			Cone 18
	1997 (Typ)	1338 (Wet)	1939 (Dry)	1997 (Typ)	1938 (Wet)	1333 (Dry)	1997 (Typ)	1938 (Wet)	1999 (Dry)	1997 (Typ) 1	338 (Wet)	1333 (Dry)	1997 (Typ)	(1938 (Wet)	1939 (Dry) 1	1997 (Typ)	1938 (Wet)	1939 (Dry)	337 (Wet) 1	938 (Typ)
Crop	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches									
Apple, Pear, Cherry, Plum and Prune	6.9	11.9	6.9	5.8	9.6	7.5	7.6	12.3	10.5	6.6	10.6	8.3	5.3	9.4	4.9	6.1	8.2	5.5	e/u	nta
Apple, Pear, Cherry etc w/cover crop	4.4	7.5	5	4.3	4.9	4.9	5.5	6.8	6.6	4.7	5.6	5.6	3.2	5.6	3.4	3.9	5.1	4.7	elu	n/a
Immature Apple, Pear, Cherry etc	7.2	12.9	17	6.1	ŧ	7.6	7.9	13.9	10.6	6.9	12.5	8.4	5.5	10.6	4.9	6.5	9.8	5.9	elu	ęľu
Peach, Nectarine and Apricots	7.1	9	6.9	5.6	9.7	7.5	ela	ela	ela	6.5	10.9	8.2	5.5	₽	5	6.1	8.7	5.7	2.6	2.6
Immature Peach, Nectarine and Apricots	7.4	12.8	~	5.8	10.4	7.5	ela	e/u	ela	6.8	5	8.4	5.5	10.5	2	6.4	9.3	5.7	elu	n/a
Almonds	6.9	11.9	6.9	5.7	9.3	7.2	7.5	12.4	10.2	6.4	10.5	8.2	5.2	0	4.8	6.1	8.3	5.5	elu	ela
Almonds w/ cover crop	5.3	8.8	5.7	4.5	6.1	5.5	6.1	8.7	7.7	5.3	~	6.4	3.6	6.7	3.8	4.4	6.2	4.8	elu	e/u
Immature Almonds	7.3	12.8	1.1	5.9	10.2	7.4	7.7	13.6	10.6	6.8	11.8	8.3	5.5	9	4.9	6.7	9.3	5.6	elu	e/u
Walnuts	6.7	9	6.9	5.6	9.5	7.5	7.6	12.2	10.2	6.4	10.5	8.2	5.2	9.7	5	ø	8.1	5.7	elu	e¦u
Immature Walnuts	7.2	12.9	1.1	6.1	ŧ	7.6	7.9	13.8	10.6	6.9	12.4	8.3	5.6	10.7	5.1	6.5	₽	9	e/u	e/u
Pistachio	6.5	12.2	2	5.8	10.8	7.6	7.7	13.4	10.4	6.5	12.1	8.2	5.4	10.4	4.9	6.5	10.4	6.1	e/u	e/u
Pistachio w/ cover crop	4.7	8.8	5.8	4.8	7.9	5.9	6.1	9.3	7.7	5.5	8.8	6.6	4	8.1	4.3	4.7	8.5	5.4	elu	e/u
Immature Pistachio	7.2	12.9	1.1	6.1	Ħ	7.6	0	14	10.7	6.7	12.2	8.2	5.5	10.6	4.9	6.7	10.5	6.1	elu	e/u
Mise. Deciduous	6.9	12.1	6.9	5.6	9.7	7.5	7.3	12.3	9.9	6.4	10.8	8.3	5.3	9.6	4.8	6.1	8.6	5.6	2.6	2.7
Immature Mise. Deciduous	7.4	12.8	~	5.9	10.5	7.5	7.6	12.9	10.1	6.8	¢	8.4	5.5	10.4	4.9	6.4	9.4	5.7	elu	e/u
Grain and Grain Hay	6.3	7.2	2.5	3.7	5.2	3.1	5.4	7.7	5.2	4.8	9	3.8	4	4.7	1.6	3.8	4.9	્ય	2.9	1.2
Rice	7.1	11.9	~	5.6	₽	8.1	ela	ela	ela	6.8	11.1	8.6	5.7	10.6	5.4	elu	ela	elu	elu	e/u
Cotton	6.6	12.1	6.5	5.3	10.2	7.4	ela	e/u	ela	6.1	11.8	8.3	5.4	9.9	5.1	6.2	9.7	5.2	2.2	2.3
Safflower and Sunflower	6.9	8.6	5.3	5	6.2	6.3	ela	ela	ela	5.5	6.9	2	4.2	6.7	4	5.3	6.4	4.2	e	2.3
Corn and Grain Sorghum	6.8	12.4	6.8	5.6	9.7	6.8	7.5	11.6	8.9	6.4	11.1	17	5.3	9.8	4.9	6.1	8.8	5.7	3.1	2.2
Beans	1.1	12.5	6.8	5.9	9.7	6.7	e/u	e/u	ela	6.5	10.9	2	5.3	3.8	4.8	6.1	8.6	5.7	2.6	2.3
Misc. field crops	1.1	12.5	6.8	5.7	3.6	6.6	e/u	e/u	e/u	6.5	10.9	2	5.3	9.8	4.9	6.2	8.7	5.7	2.5	2.2
Alfalfa Hay and Clover	2.8	5.3	2.9	2.3	4.5	3	2.6	5.1	4	2.5	4.8	3.2	1.9	4.9	1.8	2.2	4.3	2.5	1.6	1.8
Pasture and Misc. Grasses	6.8	10.1	6.3	5.6	00	6.9	6.7	9.3	8.5	9	6	7.6	5.3	8.5	4.5	5.9	7.1	4.9	2.3	2.5
Small Vegetables (Double Crop)	4.8	8.4	4.4	3.2	5.8	4	5.7	10.2	6.6	4.4	6.8	4.5	2.6	5.5	2.9	2.8	6.6	3.7	2.7	2.1
Tomatoes and Peppers	7.5	12.9	7.1	6.2	10.3	7.8	e/u	e/u	e/u	6.7	11.2	8.1	5.5	10.5	2	6.7	9.1	6.1	3.1	2.4
Potatoes, Sugar beets, Turnip etc.	6.4	6	4.9	4.5	6.3	5.9	e/u	e/u	e/u	5.2	7.2	6.7	4.6	6.7	3.7	5	5.2	3.6	2.2	0.9
Melons, Squash, and Cucumbers	7.4	13.8	7.4	6.3	11.7	8.2	e/u	e/u	e/u	7.2	13.1	8.8	5.9	11.1	5.4	7	11	6.4	3.2	2.5
Onions and Garlic	7.1	8.2	3.5	4.8	9	4.4	e/u	ela	ela	5.5	6.8	4.8	4.5	5.8	2.4	4.6	5.3	e	2.3	1.3
Strawberries	7.4	12.9	r	5.7	9.6	6.8	7.8	Q	9.1	6.6	11.4	7.3	5.6	10.2	5.1	e/u	elu	e/u	e/u	n/a
Flowers, Nursery and Christmas Tree	6.8	12.6	7.2	5.7	10.1	7.7	7.9	12.2	10.8	6.6	11.2	8.6	5.4	9.7	4.9	6.6	8.9	9	2.5	2.6
Citrus (no ground cover)	5.1	8.6	5.1	4.6	7.2	5.4	e/u	e/u	ela	5.3	8.2	5.9	3.6	7.4	3.6	3.8	7.1	4.5	2.9	2.3
Immature Citrus	6.5	11.5	6.3	5.4	9.7	6.8	e/u	e/u	e/u	6.2	10.8	7.6	4.8	3.6	4.6	5.4	8.7	5.1	0	2.3
Avocado	2	12.1	6.9	6.1	10.3	7.9	e/u	e/u	e/u	e/u	e/u	e/u	e/u	e/a	e/u	e/u	elu	e/u	e/u	nta
Mise Subtropical	5.1	8.6	5.1	4.5	1.1	5.3	5.9	8.9	7.3	5.3	8.2	5.9	3.6	7.5	3.6	3.9	7.2	4.5	2.8	2.3
Grape Vines with 40% canopy	e/u	e/u	n/a	e/u	e/u	elu	e/u	e/u	e/u	e/u	e/u	ela 🗧	e/u	e/u	e/u	e/u	ela	e/u	e/u	nta
Grape Vines with cover crop (60% canopy)	e/u	ela	c¦u	e ^j u	e¦u	e/u	ela	elu	e/u	e/a	e/u	e/u	n/a							
Grape Vines with 60% canopy	ela	e/u	e/u	e¦u	e'n	e¦u	e/u	e/u	elu	ę	ę	elu	e/u	ela	e ju	e/u	elu	e/u	e/u	e/u
Grape Vines	7.2	12.3	6.8	5.7	10.3	7.4	7.8	13	10.7	6.7	11.9	8.4	5.3	10.1	4.9	6.1	8.6	5.6	2.9	2.3
Grape Vines w/ cover crop	5.7	3.8	Q	4.8	8.4	6.2	6.6	9.9	8.5	5.8	3.6	6.9	4.2	8.5	4.3	4.7	7.5	5.2	e/u	n/a
Immature Grape Vines	7.4	12.8	6.9	5.9	10.7	7.5	8.1	13.8	10.9	6.9	12.3	8.4	5.4	10.3	4.9	6.3	9.2	5.5	1.4	1.1
Idle	7.8	13.3	6.9	6.1	11.1	7.7	8.2	14.4	10.8	r	12.7	8.4	5.6	10.8	5.1	6.7	10.7	6.1	3.3	2.6

1939 (Dry) Inches 2 일일 일일

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Zones 1
Precipitation,
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Table 42.
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Cal Poly ITRC **Transpiration** from Precipitation Annual Values by DWR ETO Zone and Year

		Zone 1			ZODE J			200c				-		ZODE 0				
	1997 (Typ)	1338 (Wet)	1333 (Dry)	1997 (Typ)	1938 (Wet)	1939 (Dry)	1997 (Typ)	1938 (Wet)	1939 (Dry)	1997 (Typ)	1338 (Wet)	1333 (Dry)	1997 (Typ)	1338 (Wet)	1939 (Dry)	1997 (Typ)	1938 (Wet)	1333 (Dry)
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
, Cherry, Plum and Prune	3.7	1.9	2.8	4.3	3.7	3.4		2.3	11	2.8	1.7	15	3.4	2	2.9	2.8	2.6	1.7
, Cherry etc w/cover crop	4.4	00	5.2	r	n	8.3	r	9.3	5.7	6.3	7.4	3.2	9	10.3	7.8	6.1	3.6	3.8
ople, Pear, Cherry etc	1.9	1.3	2.4	2.6	1.3	11	2.7	1.8	0.8	2.7	1.2	6.0	1.9	4.1	1.5	2.8	1.4	11
arine and Apricots	2.4	2.3	2.1	3.3	2.3	2.5		2.5	1.4	2.8	2.1	11	3.3	5.7	1.9	3.2	3.2	1.8
ach, Nectarine and Apricots 🛛 📙	0.9	1.3	2.3	3.1	1.4	1.4	2.8	5	0.7	1.7	1.4	1.2	2.2	4.3	1.8	2.1	1.3	1.5
	e/u	e e	ela	3.7	3.8	4	eju	ę	ę	4.2	6.3	12	5.2	6.1	3.7	ę	ęļu	ę
l cover crop	e/u	ela	e/u	6.6	7.2	6.3	e/u	ela	ela	5.4	6.3	2.3	5.7	8.9	5.9	cha	e/u	elu
monds	e/u	ela	e/u	۳	2.3	~	e/u	ę	ela	2.5	1.7	1.2	2.6	4.6	1.8	ę.	e/u	e'u
	e/u	ela	ela	3.7	3.8	4	3.9		2.2	3.7	2.2	÷		5.1	2.7	3.8	2.2	1.4
alnuts	ę	ela	ela	2.6	1.3	÷	2.7	1.8	0.8	2.7	ç.	6.0	1.9	4.1	1.5	2.8	1.4	11
	ę	ela	ela	<i>e</i> /2	ę	e/u	e/u	ę.u	e/u	3.2	5	6.0	4.4	6.4	2.7	3.5	2.4	12
/ cover crop	ę	ela	ela	e/a	ę	e/u	e/u	eju	e/u	12.4	13.2	4.5	e/u	e/u	ela	1.1	17.6	5.6
stachio	ę,u	cha	e/u	e/u	e'e	eju	e/u	eju	e/u	2.7	ç.	6.0	61	4.1	15	2.8	1.4	÷
luous	3.8	3.2	2.3	£.1	3.2	4.3	4.3	3.3	1.8	4.7	3.3	13	4.9	6.6	3.6	2.8	3.9	1.6
lisc. Deciduous	6.0	1.3	2.3	3.1	1.4	1.4	2.8	~	0.7	1.7	1	12	2.2	4.3	1.8	2.1	13	1.5
irain Hay	2.9	8.7	4	4.4	7.6	7.8	3.8	9.1	7.2	3.2	9.1	6.3	5.1	9.4	6.8	4.1	10.6	-
	eju	ele e	e/u	eje	ę	e'e	e/u	eju	e'a	e/u	ę	ę	ela	ela	<i>e</i> / <i>e</i>	eje e	elu	e'u
	e/u	ela	ela	ela	ela	e/u	e/u	elu	ela	3.7	13	F	11	1.1	0.4	ela	e/u	e/u
nd Sunflower	n/a	ela	ela	1.7	1.7	0.8	e/u	elu	elu	4.7	6.6	1.6	9.4	11.3	3.4	4.3	8.5	3.6
rain Sorghum 📔	2.8	0.1	2.4	3.3	2	1.9	3.8	1.7	2.1	3.7	1.3	11	4.1	3.9	1.9	3.8	1.4	-
	e/u	ela	ela	3.3	4.4	3.1	3.2	4	1.5	3.5	3.5	1.9	5.4	6.9	3.2	3.3	3.6	2.6
rops	2.7		5	3.3	4.4	3.1	elu	e/u	elu	3.5	3.5	1.9	5.4	6.9	3.2	3.3	3.6	2.6
and Clover	5.3	8.3	5.7	8.4	8.8	7.5	8.1	9.9	6.6	7.6	9.2	4.4	8.3	10.1	7.1	8.6	8.5	5.7
Mise. Grasses	2.8	5.8	2.8	4.6	5.6	4	4.5	5.9	2.2	3.7	5.5	1.8	5	8.1	3.4	3.2	5.9	3.9
ables (Double Crop)	0.9	3.7	0	0.2	3.3	2.6	0.1	4	2	0.4	3.8	Ð	6.0	4	2.4	0	4.1	2
nd Peppers	2.8	3.4	1.9	4.1	4.5	2.6	3.8	4.7	1.7	3.9	4.1	1.4	5.5	7.2	2.7	3.8	5	2.7
ıgar beets, Turnip etc.	0.7	11	0.9	5.8	3.8	3.7	e/u	e/u	e/u	5.4	4.3	2.2	5.1	4.8	4.2	4.8	e	13
ash, and Cucumbers	13	e	1.6	2.5	3.6	1.8	2.7	4.1	12	1.8	31	15	3.4	5.4	2.4	N	3.4	2.4
Barlic	0.5	~	0.7	3.6	-	6.3	3.2	8.4	5.8	2.5	8.4	5.1	3.2	6.5	4.3	3.1	9.9	و
B	2.7	e 9	2	33	4.4	3.1	3.2	¥	1.5	3.5	3.5	1.9	5.4	6.9	3.2	3.3	3.6	2.6
rsery and Christmas Tree	3.8	3.2	2.3	4.1	3.2	4.3	4 .3	3.3	1.8	4.7	3.3	13	49	6.6	3.6	2.8	3.9	16
round cover)	4.3	5.8	5	4 .9	6.4	٥	5.4	6.5	4.8	6.4	6.3	2.7	3.8	8.7	5.4	5.8	6.1	en 1
trus	1.8	3.2	1.4	3.8	3.4		¥	3.7	1.6	5 8; 8;	3.6	1.3	3.1	5.1	3.5	3.3	3.9	1.9
	3.8	3.2	2.3	4.1	3.2	4.3	4.3	3.3	1.8	4.7	3.3	13	21	3.5	1.7	2.8	3.9	1.6
opical	4.3	5.8	5	4.9	6.4	9	5.4	6.5	4.8	4.9	6.3	2.7	3.8	8.7	5.4	5.8	7.9	n
with 40% canopy	ela	ela	e/u	3.5	1.7	1.6	e/u	ela	e/u	2.5	1.7	1.3	4.2	4.2	1.9	ela	elu	ęu
with cover crop (60% canopy) 📙	n/a	ela	n/a	9	4.7	5.3	e/u	ela	e/u	5.3	4.9	2.2	5.3	2	5.6	c¦u	e/u	elu
with 60% canopy	e/u	ela	n/a	4.4	2.1	2.3	e/u	e/u	n/a	2.7	2.5	1.4	2	4.5	2.2	cha	e/u	e/u
	e/u	ela	e/u	ela	e'e	e/a	2.6	1.9	1.2	e/u	ę	e/u	e/u	e/a	e/e	2.8	1.7	1.3
w/ cover crop	e/u	ela	e/u	ele e	ę	e/u	6.7	5.5	4.1	e/u	ę,	eju	e/u	e/n	ela	9	7.4	2.3
pe Vines	e/u	ela	e/u	ela	e lu	e/u	2.2	2:1	11	e/u	с¦а	elu	e/u	e/n	ela	2.6	15	1.6
	e/u	e¦u	e/u	e¦u	ę	elu	e/u	c¦u	e¦u	c/u	eju	elu	e u	e¦u	elu	eju	elu	c/u
					:		-		:			:			-	;		
otation				с 7.	P. Market Revenue and P							0						

Cal Poly ITRC Transpiration from Precipitation Annual Values by DWR ETo Zone and Year																					
		Zone 10			Zone 12			Zone 13			Zone 14			Zone 15			Zone 16			Zone 18	
	1997 (Typ)	1938 (Wet)	1939 (Dry)	1997 (Typ)	1938 (Wet)	1939 (Dry)	1 (dyT) 10	998 (Wet) 1	1999 (Dry)	1997 (Typ) 1	338 (Wet) 1	(933 (Dry)	1997 (Typ) 1	1338 (Wet)	1999 (Dry)	1997 (Typ)	1998 (Wet)	1333 (Dry)	1997 (Wet)	1938 (Typ)	1333 (Dr)
Crop	Inches	Inches	hches	Inches	Inches	Inches	Inches	Inches	Inches	liches	Inches	Inches -	Inches	Inches -							
Apple, Pear, Cherry, Plum and Prune	4	<u>R</u> 9	0.0	+ u	4 Q	0.0	0.01	0.4	0.0	4 u	5 ¥	2	0.0	2.2	- °	27	4 0 4 7	<u>e</u> ;	g :	g -	2 -
repret real, crienty externationed upper Immature Apple, Pear, Cherru etc		2.6	÷ e	, 90	54	3 8	2	2.6	13	980	- 9	10	2 =	3 8	0.7	ŧ 60	5 2	; -			
Peach, Nectarine and Apricots	3.2	5.5	-	2	5	5	e/u	elu	ela	2.6	6.5	05	2.2	5	13	2.6	4.8	14	9.0	-	0.2
Immature Peach, Nectarine and Apricots	1.9	1.7	0.5	6.0	2.7	0.3	elu	e/u	e/u	-	2.6	0.4	1.6	7	0.5	9.4	1.8	5	e/u	eju	ę
Almonds	3.9	4.9	0.8	3.3	5.2	1.7	4	5.9	e 1	3.1	5.7	12	2.3	45	12	2.4	6. 4	1.9	çu	eju	e a
Almonds w/ cover crop	6.3	10.1	3.6	5.9	9.4	3.2	4.2	3.5	5.9	5.1	3.5	3.7	4.5	6.9	2.2	4.1	8.7	2.7	e¦u	e/u	e/u
Immature Almonds	1.7	~	0.2	0.5	2.7	0.3	1.9	2.3	1.4	0.7	2.3	0.2	1.3	1.6	0.7	9.0	2.4	1.2	n/a	e/u	e/u
Walnuts		5.1	1.7	2.9	5.2	1.5	4.9	6.4	3.9	3.5	9	1.8	1.8	2.8	1.1	1.9	3.8	1.4	e/u	e/u	e/u
Immature Walnuts	1.7	2.6	0.2	9.0	2.4	0.1	1.7	2.6	1.3	0.8	1.6	0.4	1.1	0.7	0.7	0.9	1.2	1	elu	nta	e/u
Pistachio	4.5	5.2	0.8	2.8	3.8	1.2	2.7	4.2	2.8	3.2	4	01	2.5	1.9	1.2	2.4	2.9	1.3	e/u	e¦u	e/u
Pistachio wł cover crop	6.2	3.5	3.6	3.2	6.7	2.8	5.3	10.2	6.1	3.9	7.5	n	3.8	5.2	1.8	4.2	ø	2.3	e/u	e¦u	eju
Immature Pistachio	1.7	2.6	0.2	9.0	2.4	0.1	1.7	2.6	1.3	0.8	1.6	0.4	1.1	0.7	0.7	0.9	1.2	1	n/a	nta	e/u
Mise. Deciduous	2.8	4.5	2.0	2.9	12	51	3.9	5	3.3	2.6	5.4	~	2.9	3.7	1.4	1.7	4.7	5: I	ela.	ę.	ę.
Immature Mise. Deciduous	1.9		0.5	6.0	2.7	0.3	15	2.7	1.7	-	2:6	\$	1.6	1.4	0.5	9 .4	9:	15	ęu	ę	ę
Grain and Grain Hay	2.1	9.5	6.5	2.7	8.2	4.6	3.3	8.9	6.2	2.2	8.5	4.4	1.9	~	3.8	2.7	6.9	4.5	0.5	1.4	0.5
Rice	4.5	5.4	0.8	4	4.6	÷	c/u	e/u	e/u	3.9	5.1	1.4	2.7	3.4	-	e/u	e/u	ele e	e/u	ę	ę
Cotton	5.6	6.7	1.7	4.8	4.7	13	e/u	e/u	e/u	4.4	4.3	13	2.8	3.9	12	2.9	4.5	2.3	13	0.3	0.5
Safflower and Sunflower	4.8	10.5	2.7	5.7	9.6	1.4	ela	ęłu	ela	6.7	÷	15	n	4.8	0.8	2.5	9.3	1.9	0.4	0.3	0:3
Corn and Grain Sorghum	3.8	2.5	0.2	4.6	5	1.9	2.6	4.4	2.4	4.4	4.8	2.5	2.4	3.4	9.0	2.6	5.2	12	4.0	0.1	<u>م</u>
Beans	3.3	4	0	3.2	4.2	1.6	e/u	e/u	n/a	3.1	4.3	1.3	2	2.8	0.6	2.3	4	1.2	0.4	0.2	0.3
Misc. field crops	3.3	4	•	3.2	4.2	1.6	e/u	e/u	e/u	3.1	4.3	13	Q	2.8	9.0	2.3	4	1,2	0.4	0.2	0.3
Alfalfa Hay and Clover	8.5	11.2	5.3	6.2	3.5	4.6	r	10.9	7.5	6.6	10.2	5	5.9	7.6	3.7	6.6	8.5	4.7	1.7	0.7	9.4
Pasture and Misc. Grasses	4.1	7.6	2.5	3.1	6.1	1.3	3.4	00	4.3	4.4	6.6	1.3	2.7	4.6	1.8	2.8	6.6	2.4	0.9	0.1	0.3
Small Vegetables (Double Crop)	e 1	5.3	2.8	2.5	ø	e	Q	4.4	4.5	23	6.1	3.1	2.8	51	-	3.5	4.5	1.8	0.2	0.2	•
Tomatoes and Peppers	4.8	5.7	0.8	4.9	6.1	2.2	e/u	n/a	n/a	5.1	6.9	2.7	9	4	1.5	2.7	6.4	1.8	0.4	0.3	0.4
Potatoes, Sugar beets, Turnip etc.	3.5	7.8	3.7	3.9	8.3	1.9	e/u	e/u	e/u	4.2	<i>в</i>	2.1	2.3	4.8	1.3	2.5	6.4	2.5	1.3	1.8	9.0
Melons, Squash, and Cucumbers	3.2	2.4	0.5	2.1	2.3	0.4	e/u	n/a	nta	2.2	1.9	0.7	2.1	1.3	1.2	1.9	1.9	1.5	0.4	0.3	0.3
Onions and Garlic	1.8	8.7	5.7	6.1	7.5	3.5	ela	elu	ela	1.8	7.9	3.8	1.8	6.2	3.2	2.4	6.9	3.8	12	1.4	9 .4
Strawberries	3.3	4	•	3.2	4.2	1.6	3.5	5.5	2.7	3.1	4.3	13	N	2.8	9.0	ę	ę	ę	elu	e¦u	ę,
Flowers, Nursery and Christmas Tree	2.8	4.5	0.7	2.9	51	12	3.9	2	3.3	2.6	5.4	~	2.9	3.7	1.4	1.7	4.7	1.7	9.6	•	9.0 0
Citrus (no ground cover)	5	9.1	3.6	4.5	7.3	3.5	c a	e'u	ę	en (8.4	3.4	3.8	55	1.6	3.6	4.7	61	0.5	•	•
Immature Citrus	2.2	4	,	5.2	4	-	eju	eje -	ę.	2	4.4	2	5.3	2.0	51	<u>p</u>	5.5	21	ę.	ę.	2
Avocado	N.N	4	5.0	R,	2	2	ç	ç	ę	Q.N	5.4	N	ę	g	ę,	g	ş	ę	ę	ę	ŝ
Mise Subtropical	5	9.1	3.6	4.5	7.3	35	5.7	9.7	5.9		8.4	3.4	3.8	55	1.6	3.6	4.7	61	0.5	•	•
Grape Vines with 40% canopy	elu u	eju	eju	ę	e¦u	elu	ela	e/u	elu	e ^j u	ę	elu	e/u	ele e	e¦u	ę	ę	ę	elu	e¦u	ę,
Grape Vines with cover crop (60% canopy)	ela	eja	e/u	ę	ę,	e/u	e/u	e/u	e/u	e a	ę.	çu	e/u	ę	ela	ę	çu	ę	e/u	e/u	ŝ
Grape Vines with 60% canopy	e/u	efe	e/u	ę	ęų	e/u	e/a	e/u	e/u	eju	ę	ęĮu	e/u	ę	elu	ę	ęłu	ę	e/u	e¦u	e/u
Grape Vines	4.3	5.5	13	2.6	4	13	3.1	9	2.7	3.1	4.6	~	~	2.8	11	<u>ت</u>	3.6	13	9.6	•	8.0 0.0
Grape Vines w/ cover crop	6.1	10.7	3.3	5.3	7.4	3.2	5.9	10.3	5.8	5.8	8.3	3.8	3.7	5.5	1.8	3.7	7.1	21	ela	c¦u	ŝ
Immature Grape Vines	1.6	2.4	0.4	12	2.5	0.2	13	2.3	6.0	=	2.7	7 0	11	-	-	5	2.3	9.0	ę	e¦u	e,u
Idle	c/u	ç	c/u	4	ş	qu	c,u	c/u	çju	ş	4	ç	ç	ç	eju	ç	ę	ę	ę,	ç	4
Total Drocinitation	16.6	36	66	16.5	30.6	115	212	35.6	22.2	19.6	34.2	ţ	8.4	17.2	6.4	92	20.5	3.6	34	2.6	15
		\$				1	4			202		2	-			-	-	4		i	1

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ETc Table 43. Transpiration from Precipitation, Zones 10-18