



# The Drought Survivability Study

## Plot Comparison Photos

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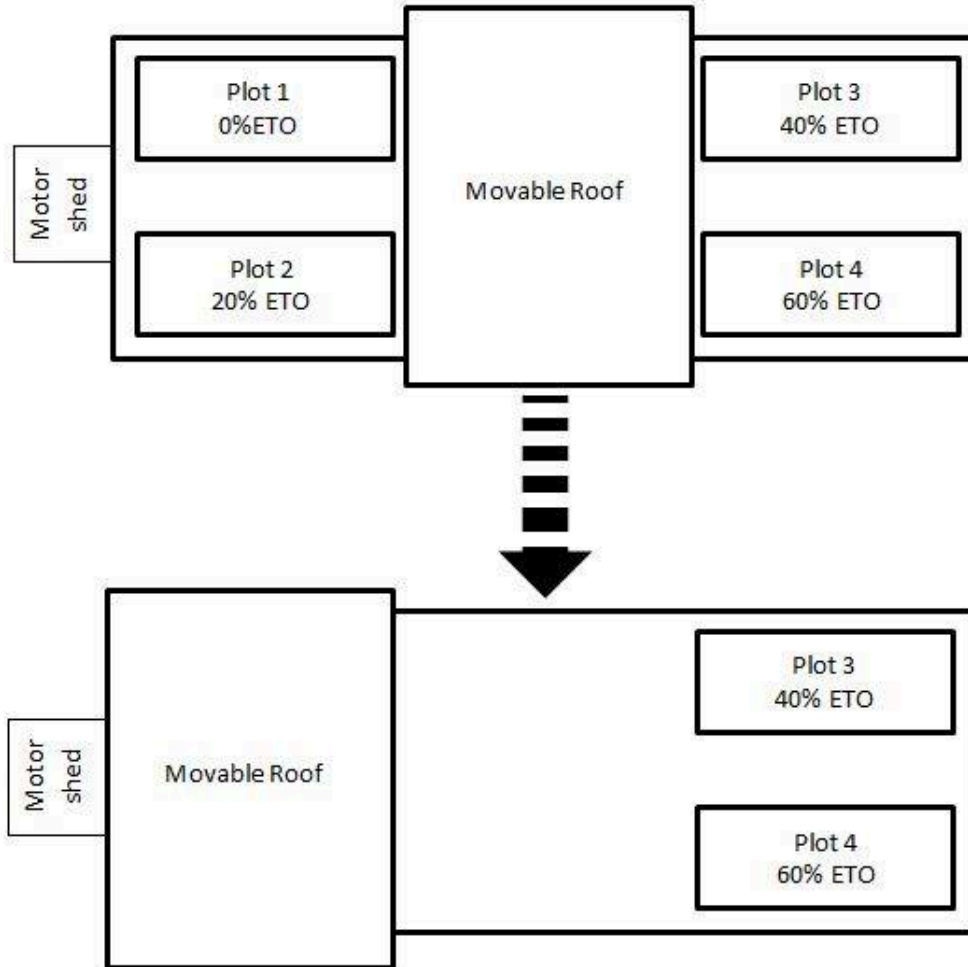


# The Drought Survivability Study

The Drought Survivability Study (D.S.S) is a horticultural experiment conducted by the Texas A&M Institute for Renewable Natural Resources that tested the drought tolerances of 96 ornamental species under 4 different irrigation regimes.

Each of the 4 experimental plots contained all 96 plant species and was irrigated at a different percentage of Potential Evapotranspiration (ETO) as follows: 0% ETO, 20% ETO, 40% ETO, and 60% ETO.

Plots 1 and 2, with the lowest irrigation were covered by a movable roof when it rained.



The Drought Simulator is located on the South Side of San Antonio, Texas, and owned by San Antonio Water Systems.



# Evapotranspiration

- **Evapotranspiration** – The water a plant loses through evaporation and transpiration.
- **Potential Evapotranspiration (ETO)**- an estimate of evapotranspiration calculated using the Penman-Montieth equation, and climactic data such as temperature, dew point, wind speed, and solar radiation.
- All historic and current ETO values were obtained from the Texas ET network, available at <http://texaset.tamu.edu/pet.php>.

Table 1. Historical Monthly Evapotranspiration Averages in inches for Austin and San Antonio, Texas

<b>City</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Total</b>
Austin	2.27	2.72	4.34	5.27	6.39	7.15	7.22	7.25	5.57	4.38	2.74	2.21	57.51
San Antonio	2.42	2.9	4.42	5.47	6.47	6.97	7.31	6.99	5.64	4.44	2.85	2.36	58.24

# Evapotranspiration

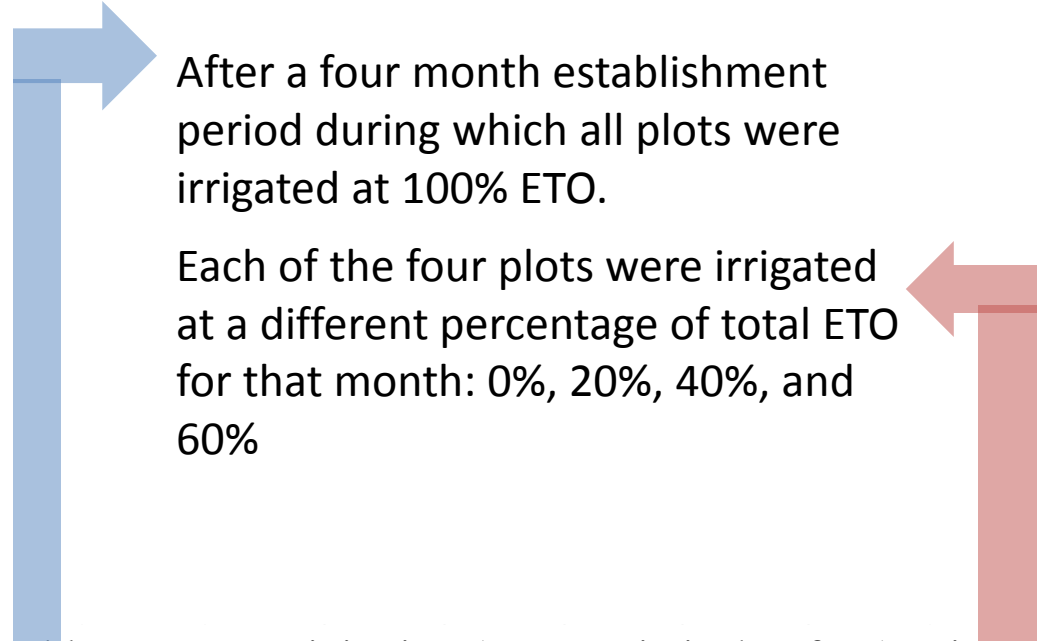


Table 1. Historical Monthly Evapotranspiration Averages in inches for Austin and San Antonio, Texas

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Austin	2.27	2.72	4.34	5.27	6.39	7.15	7.22	7.25	5.57	4.38	2.74	2.21	57.51
San Antonio	2.42	2.9	4.42	5.47	6.47	6.97	7.31	6.99	5.64	4.44	2.85	2.36	58.24

# Irrigation

Table 3. Monthly Irrigation in inches based on San Antonio ETO

<b>% ETO</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Total</b>
100%	7.31	6.99	5.64	19.94
60%	4.39	4.19	3.38	11.964
40%	2.92	2.8	2.26	7.976
20%	1.46	1.4	1.13	3.988
0%	0	0	0	0

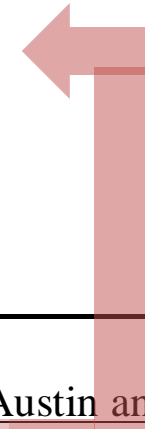


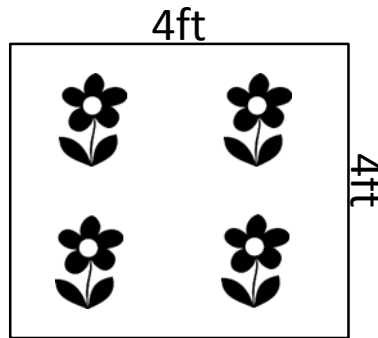
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# Irrigation

Using a simple formula, inches can be converted to gallons

For example, if you were trying to apply 2 inches of water to these four plants



You would calculate gallons as follows:

$$\text{Gallons} = \text{Inches} \times \text{Square Feet Irrigated} \times 0.62$$

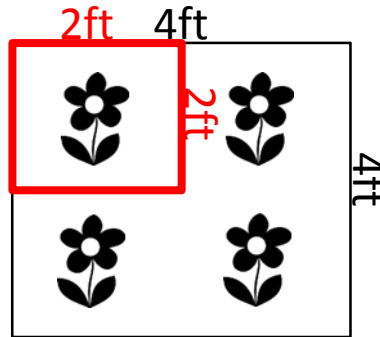
$$\text{Gallons} = 2 \text{ inches} \times 16 \text{ square feet} \times 0.62$$

$$\text{Gallons} = 19.8$$



# Irrigation

If instead, you only wanted to irrigate 1 plant



You would calculate gallons as follows:

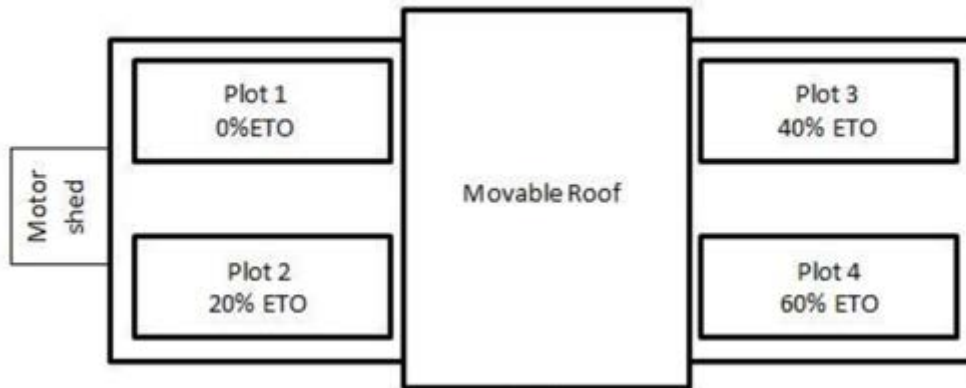
$$\text{Gallons} = \text{Inches} \times \text{Square Feet Irrigated} \times 0.62$$

$$\text{Gallons} = 2 \text{ inches} \times 4 \text{ square feet} \times 0.62$$

$$\text{Gallons} = 4.96$$

# Irrigation at the Drought Survivability Study

From Mid-July to September each plot was irrigated at a different percentage of ETO



Individual plants received the following irrigation over 12 weeks:

- Plot 1 plants= 0 gallons
- Plot 2 plants≈9 gallons
- Plot 3 plants≈17 gallons
- Plot 4 plants≈25 gallons

# Full Plot Comparisons

0% ETO

20% ETO



40% ETO

60% ETO

# Belinda's Dream Rose

0% ETO

20% ETO



40% ETO

60% ETO

# Bicolor Iris

0% ETO



20% ETO



40% ETO



60% ETO

# Coral Honeysuckle

0% ETO

20% ETO



40% ETO

60% ETO

# Mexican Honeysuckle

0% ETO

20% ETO



40% ETO

60% ETO

# Oleander

0% ETO

20% ETO



40% ETO

60% ETO



# Turks Cap

0% ETO

20% ETO



40% ETO

60% ETO

# Prostrate Rosemary

0% ETO



20% ETO



40% ETO



60% ETO



# Sabal Minor Palm

0% ETO

20% ETO



40% ETO

60% ETO

# Texas Sotol

0% ETO



20% ETO



40% ETO



60% ETO

# Thyrallis

0% ETO



20% ETO



40% ETO



60% ETO

# Bulbine

0% ETO



20% ETO



40% ETO



60% ETO

# Cenizo

0% ETO



20% ETO



40% ETO



60% ETO

# Chile Pequin

0% ETO



20% ETO



40% ETO



60% ETO



# Daylily

0% ETO



20% ETO



40% ETO



60% ETO

# Glossy Abelia

0% ETO



20% ETO



40% ETO



60% ETO



# Little Bluestem

0% ETO



20% ETO



40% ETO

Photo Not  
Available

60% ETO

# Mexican Dwarf Petunia

0% ETO

20% ETO



40% ETO

60% ETO

# Mexican Feather Grass

0% ETO

20% ETO



40% ETO

60% ETO

# Monkey Grass

0% ETO



20% ETO



40% ETO



60% ETO



# Moy Grande Hibiscus

0% ETO

20% ETO



40% ETO

60% ETO

# Pittosporum

0% ETO

20% ETO



40% ETO

60% ETO



# Pride of Barbados

0% ETO



20% ETO



40% ETO



60% ETO

# Purple Heart

0% ETO



20% ETO



40% ETO



60% ETO

# Yellow Columbine

0% ETO

20% ETO



40% ETO

60% ETO

# Cross Vine

0% ETO



20% ETO



40% ETO



60% ETO

# Blue Grama Grass

0% ETO

20% ETO



40% ETO

60% ETO

# Butterfly Vine

0% ETO

20% ETO



40% ETO

60% ETO

# Carolina Jessamine Vine

0% ETO

20% ETO



40% ETO

60% ETO

# Cemetery Iris

0% ETO



20% ETO



40% ETO



60% ETO



# Dwarf Nandina

0% ETO



20% ETO



40% ETO



60% ETO

# Esperanza

0% ETO



20% ETO



40% ETO



60% ETO

# Four Nerve Daisy

0% ETO

20% ETO



40% ETO

60% ETO

# Grandma's Yellow Rose

0% ETO

20% ETO



40% ETO

60% ETO

# Gregg's Salvia

0% ETO



20% ETO



40% ETO



60% ETO

# Indian Grass

0% ETO

20% ETO



40% ETO

60% ETO

# Jerusalem Sage

0% ETO

20% ETO



40% ETO

60% ETO

# New Gold Lantana

0% ETO

20% ETO



40% ETO

60% ETO



# Primrose Jasmine

0% ETO



20% ETO



40% ETO



60% ETO

# Purple Fountain Grass

0% ETO

20% ETO



40% ETO

60% ETO

# Spreading Juniper

0% ETO

20% ETO



40% ETO

60% ETO

# American Beautyberry

0% ETO

20% ETO



40% ETO

60% ETO

# Anacacho Orchid

0% ETO

20% ETO



40% ETO

60% ETO

# Asiatic Jasmine

0% ETO



20% ETO



40% ETO



60% ETO

# Buford Holly

0% ETO



20% ETO



40% ETO



60% ETO

# Confetti Lantana

0% ETO



20% ETO



40% ETO



60% ETO



# Crepe Myrtle

0% ETO



20% ETO



40% ETO



60% ETO



# Dwarf Chinese Holly

0% ETO

20% ETO



40% ETO

60% ETO

# Fall Obedient Plant

0% ETO



20% ETO



40% ETO



60% ETO

# Garden Phlox

0% ETO



20% ETO



40% ETO



60% ETO

# Henry Duelberg Salvia

0% ETO

20% ETO



40% ETO

60% ETO

# Knock Out Rose

0% ETO



20% ETO



40% ETO



60% ETO

# Lindheimer Muhly

0% ETO

20% ETO



40% ETO

60% ETO

# Mexican Bush Sage

0% ETO

20% ETO



40% ETO

60% ETO



# Milkweed

0% ETO

20% ETO



40% ETO

60% ETO

# Mystic Spires Salvia

0% ETO

20% ETO



40% ETO

60% ETO

# Nolina

0% ETO



20% ETO



40% ETO



60% ETO

# Pink Skullcap

0% ETO

20% ETO



40% ETO

60% ETO

# Rock Rose

0% ETO



20% ETO



40% ETO



60% ETO



# Variegated Liriope

0% ETO



20% ETO



40% ETO



60% ETO

# Viburnum Tinus

0% ETO

20% ETO



40% ETO

60% ETO

# Agarita

0% ETO



20% ETO



40% ETO



60% ETO



# Boxwood

0% ETO



20% ETO



40% ETO



60% ETO

# Evergreen Sumac

0% ETO

20% ETO



40% ETO

60% ETO

# Gulf Muhly

0% ETO

20% ETO



40% ETO

60% ETO

# Large Daylily

0% ETO

20% ETO



40% ETO

60% ETO

# Martha Gonzales Rose

0% ETO

20% ETO



40% ETO

60% ETO

# Mexican Oregano

0% ETO

20% ETO



40% ETO

60% ETO

# Mistflower

0% ETO

20% ETO



40% ETO

60% ETO

# Purple Coneflower

0% ETO



20% ETO



40% ETO



60% ETO





# Red Yucca

0% ETO

20% ETO



40% ETO

60% ETO

# Rosemary

0% ETO

20% ETO



40% ETO

60% ETO

# Sandankwa Viburnum

0% ETO



20% ETO



40% ETO



60% ETO

# Yaupon Holly

0% ETO



20% ETO



40% ETO



60% ETO

# Gulf Muhly (1 gallon)

0% ETO

20% ETO



40% ETO

60% ETO

# Santolina

0% ETO

20% ETO



40% ETO

60% ETO

# Possumhaw Holly

0% ETO



20% ETO



40% ETO



60% ETO

# Pomegranate Tree

0% ETO



20% ETO



40% ETO



60% ETO



# Flare Rose Hibiscus

0% ETO



20% ETO



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40% ETO

60% ETO

# Rock Rose

0% ETO



20% ETO



40% ETO



60% ETO



# Dutch Iris

0% ETO



20% ETO



40% ETO



60% ETO

# Bat-faced Cuphea

0% ETO

20% ETO



40% ETO

60% ETO

# Blackfoot Daisy

0% ETO

20% ETO



40% ETO

60% ETO

# Blue Liriope

0% ETO

20% ETO



40% ETO

60% ETO

# Blue Princess Verbena

0% ETO

20% ETO



40% ETO

60% ETO

# Butterfly Mutabilis

0% ETO



20% ETO



40% ETO



60% ETO



# Compact Nandina

0% ETO

20% ETO



40% ETO

60% ETO

# Cottoneaster

0% ETO

20% ETO



40% ETO

60% ETO

# Dwarf Plumbago

0% ETO

20% ETO



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40% ETO

60% ETO

# Fall Aster

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60% ETO

# Firebush

0% ETO



20% ETO



40% ETO



60% ETO

# Flowering Senna

0% ETO

20% ETO



40% ETO

60% ETO

# Lindheimer Guara

0% ETO



20% ETO



40% ETO



60% ETO

# Little Lindheimer

0% ETO



20% ETO



40% ETO



60% ETO



# Mexican Mint Marigold

0% ETO

20% ETO



40% ETO

60% ETO

# Mountain Laurel

0% ETO



20% ETO



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60% ETO

# Photinia

0% ETO



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40% ETO



60% ETO

# Plumbago

0% ETO



20% ETO



40% ETO



60% ETO

# Sago Palm

0% ETO



20% ETO



40% ETO



60% ETO

# Society Garlic

0% ETO



20% ETO



40% ETO



60% ETO

# Zexmania

0% ETO

20% ETO



40% ETO

60% ETO