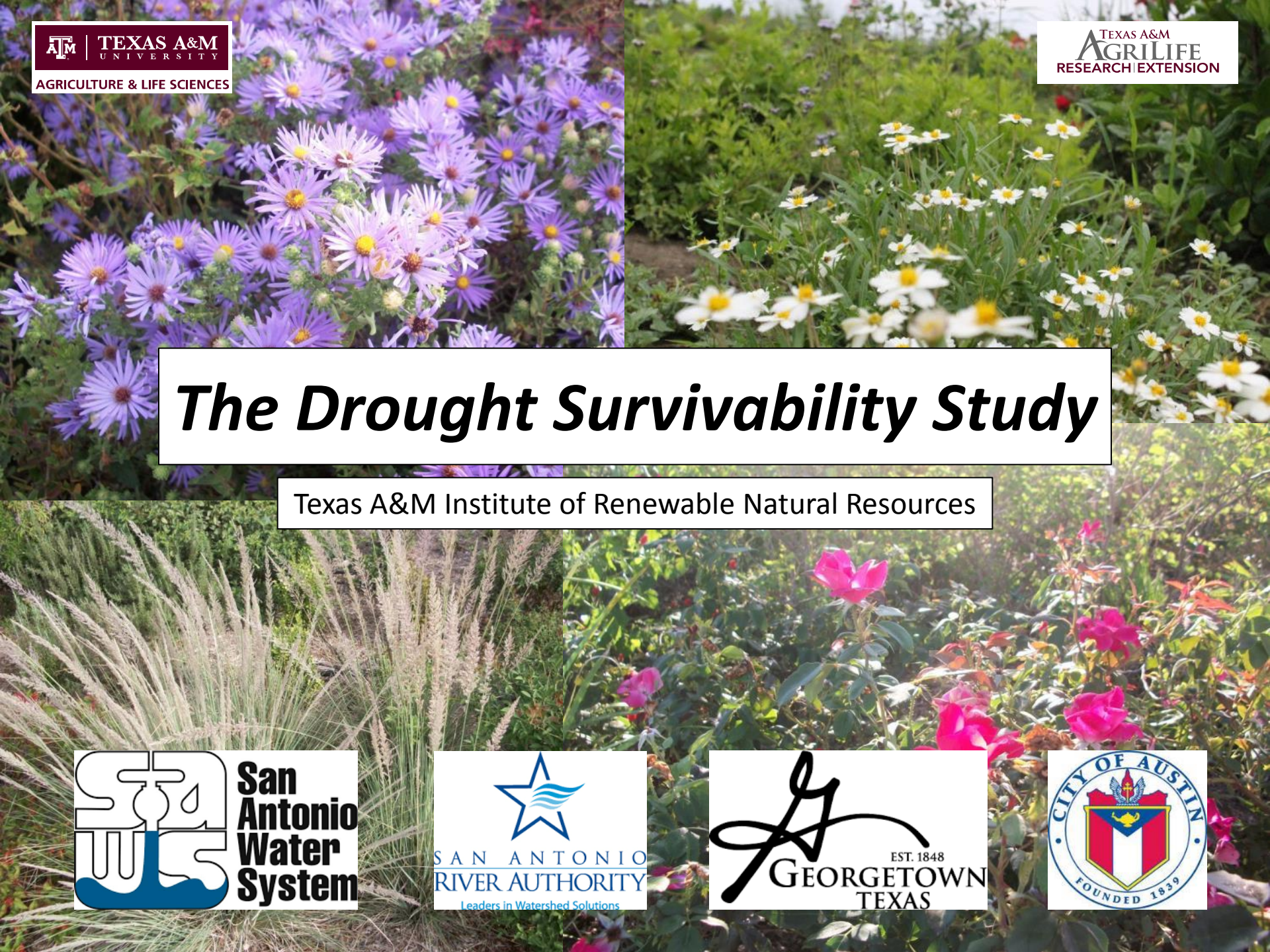
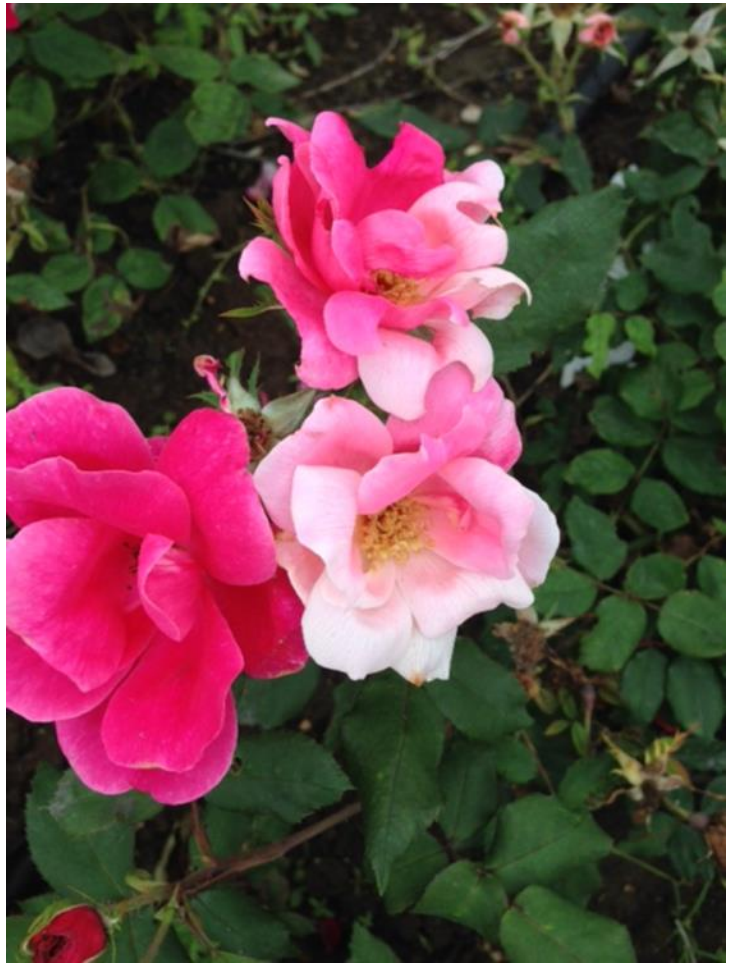


The Drought Survivability Study

Texas A&M Institute of Renewable Natural Resources

Why is landscape water use important?

- Discretionary Usage
- Data driven suggestions
- Drought impact in central Texas
- Potential water savings in urban landscaping



Research Objective

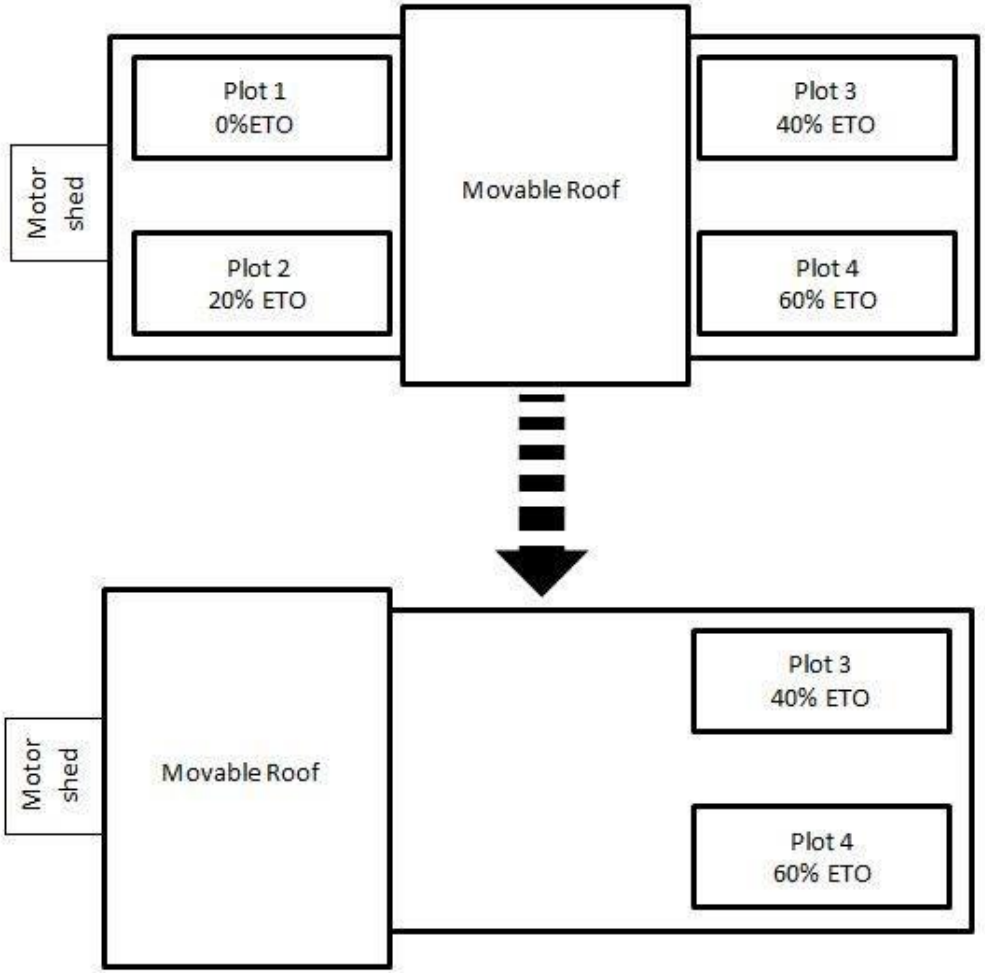
- To analyze urban landscaping for outdoor water conservation efforts for 96 ornamental plants
- Jointly funded by San Antonio Water System (SAWS), San Antonio River Authority (SARA), City of Austin, and City of Georgetown

The 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 96 ornamental 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 Evapotransipiration 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

Evapotranspiration

After a four month establishment period during which all plots were irrigated at 100% ETO.

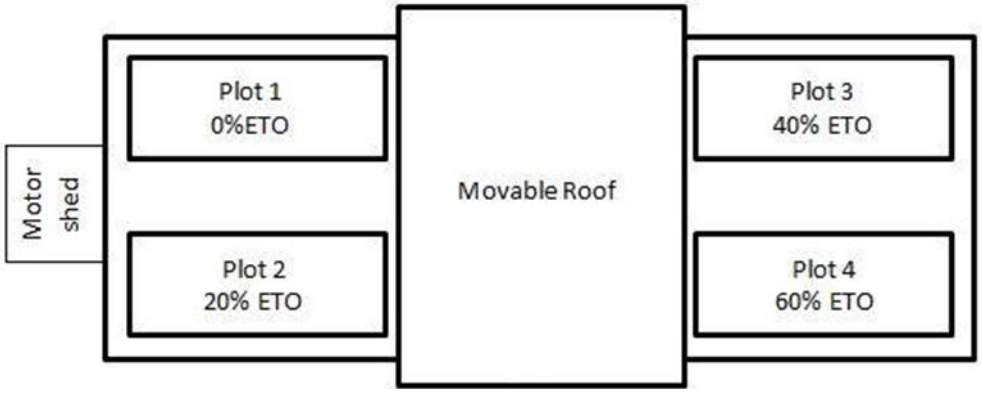
Each of the four plots were irrigated at a different percentage of total ETO for that month: 0%, 20%, 40%, and 60%

Table 1. Historical Mo ly Evapotransipiration Averages in inches for Austin d San Antonio, Texas

City	Jan	Fe	Mar	Apr	May	Jun	Jul	Aug	Sep		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 at the Drought Survivability Study

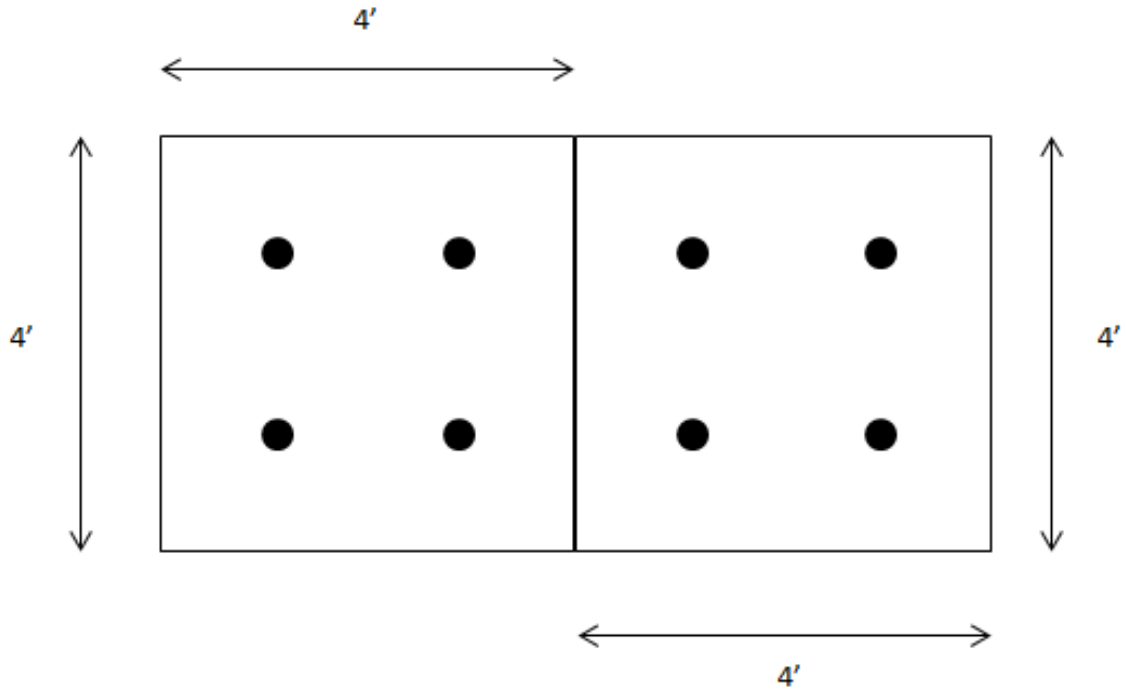
From Mid-July to September each plot was irrigated at a different percentage of ETO



Individual plants received the following irrigation for 12 weeks:

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

DIAGRAM SHOWING SAME SPECIES PLANTED IN THE 4' x 4' BLOCKS



BLOCK 1

4 ONE GAL PLANTS OF SAME SPECIES

BLOCK 2

4 ONE GAL PLANTS OF SAME SPECIES

Methods

- 96 Ornamental plants chosen using four horticultural and nursery lists from Texas
  - Perennials, Grasses, Shrubs, and Trees
- Establishment Period – February to May 2016
- Three planting days, three weeding days, twelve data collection weeks with volunteers
- Data collection period (Phase I) July to September 2015; (Phase II) December to March 2016

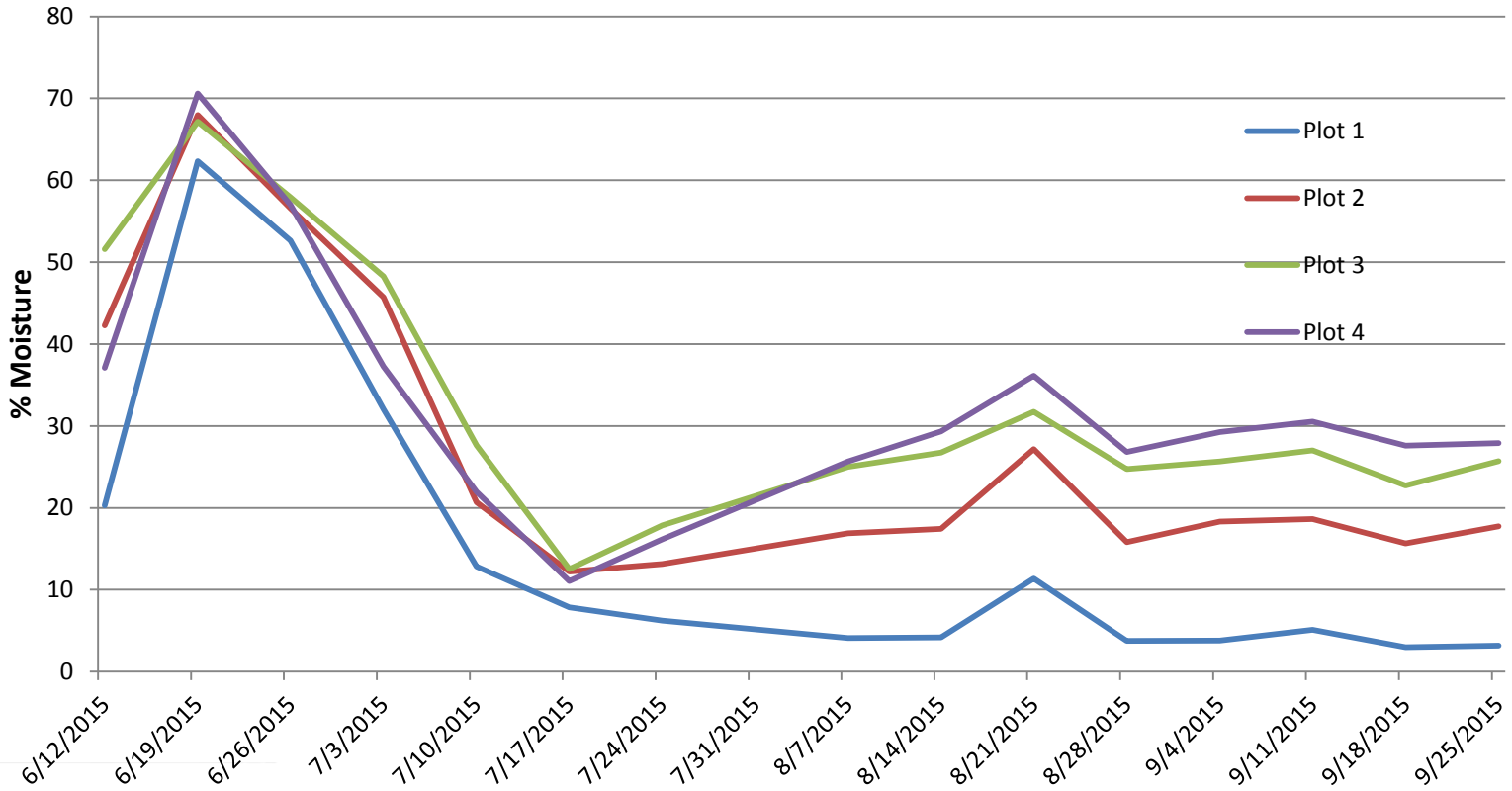
What are we collecting?

- Appearance monitoring
  - Lush, Stable, Wilt, Leaf Drop, Defoliated, Dead
- Soil Moisture Data
- Infrared Thermometer Data
  - Foliar temperature can indicate stress

Results

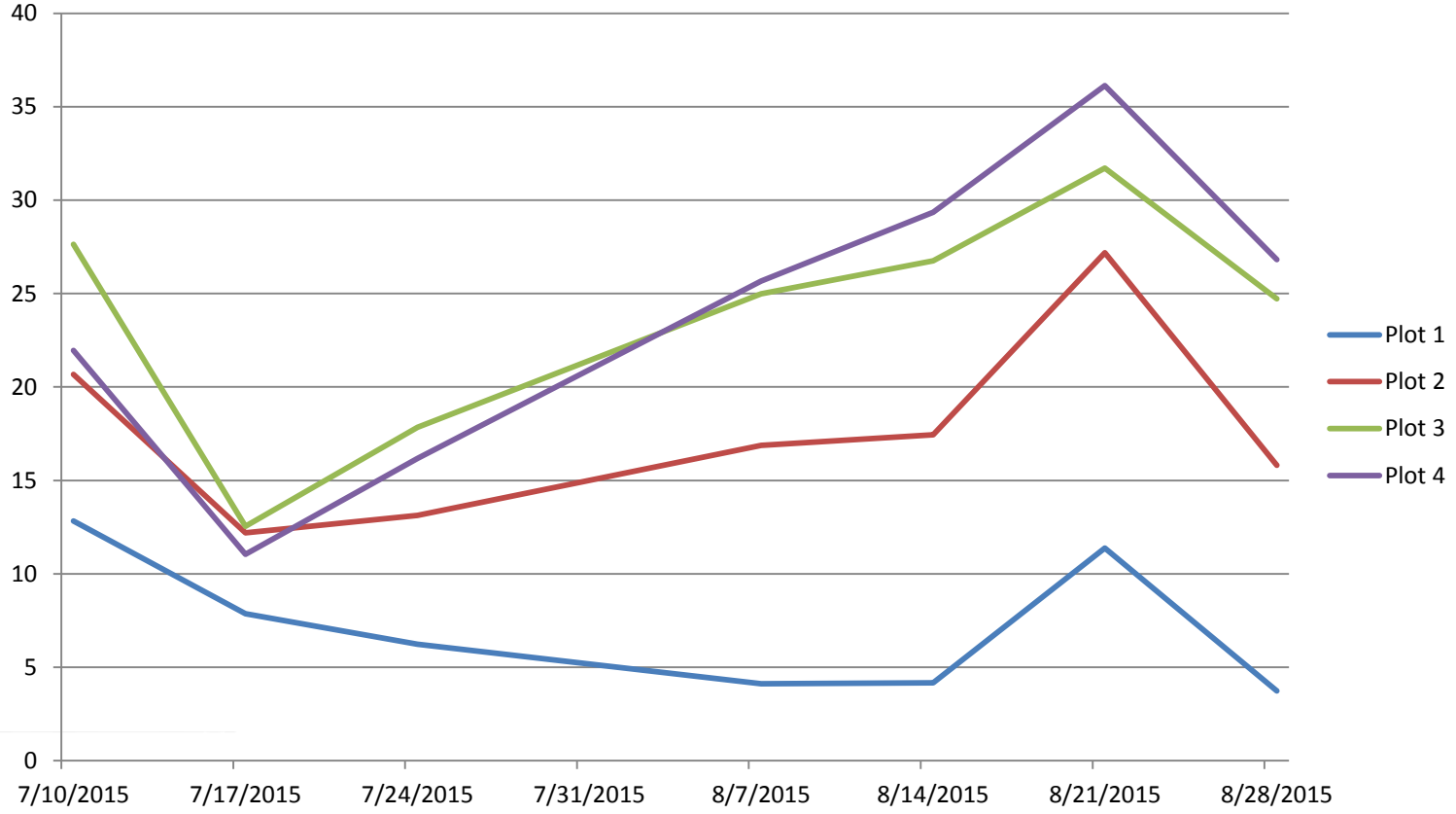
Results Phase I: Soil Moisture Over Time + Establishment Period

Figure 1. Soil Moisture Levels of Four Experimental Plots Over Time



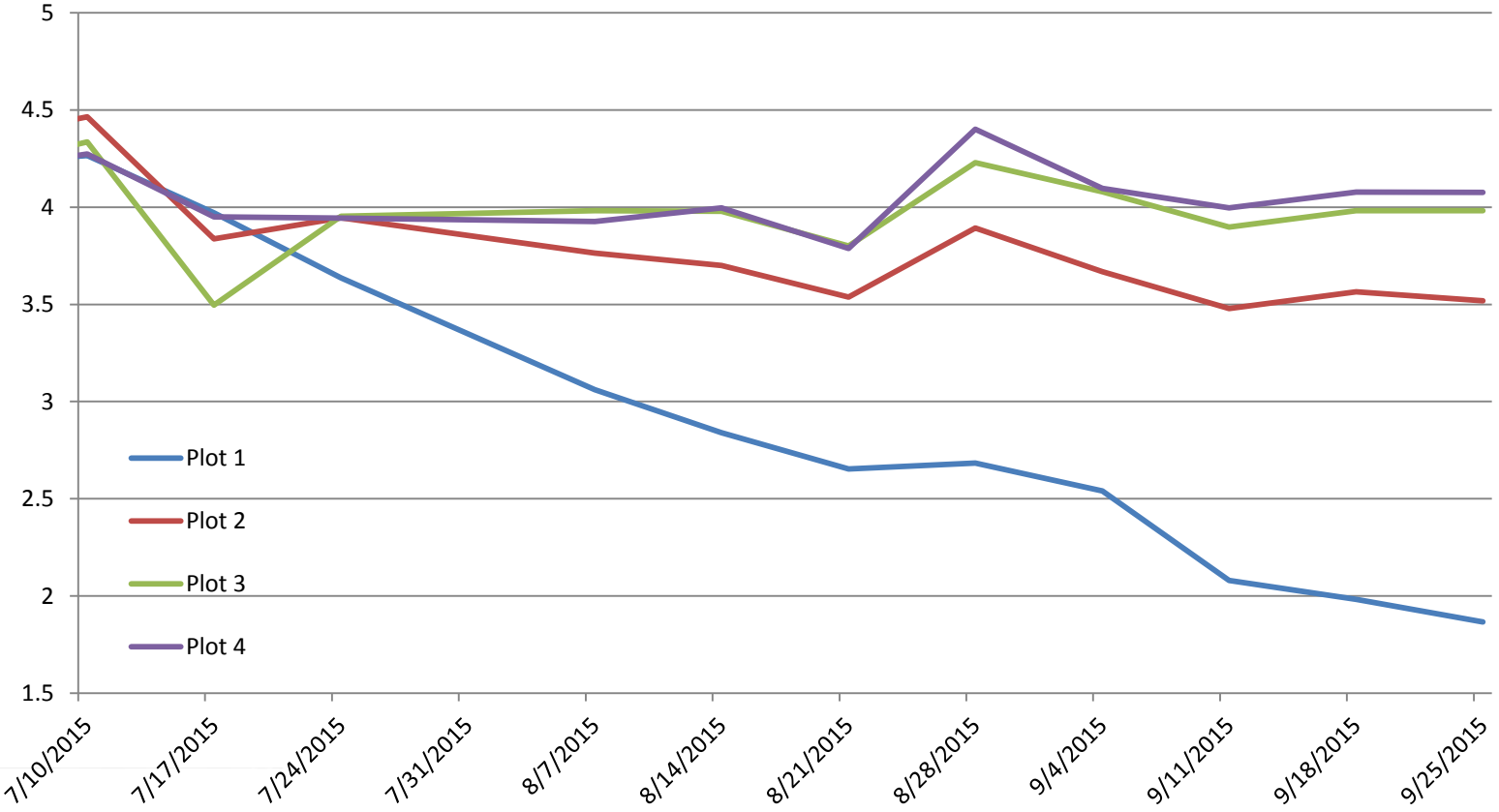
Phase I: Soil Moisture Over Time

Figure 2. Soil Moisture Levels of Four Plots From 07/10-08/07



Phase I: Appearance Ratings Over Time

Figure 4. Appearance Rating Average For All Plants in Each Plot



Methods Continued

- Phase I
  - Volunteers collect data over 16 data weeks
  - Four months of drought treatment: 0%, 20%, 40%, 60% ETo
- Phase II
  - Volunteers collect data once every month for four months
  - Four months of no additional irrigation; natural rainfall only

0% ETO

20% ETO

40% ETO

60% ETO

Turks Cap

0% ETO

20% ETO

40% ETO

60% ETO

Purple Fountain Grass

0% ETO

20% ETO

40% ETO

60% ETO

Red Yucca

0% ETO

20% ETO

40% ETO

60% ETO

Oleander

0% ETO

20% ETO

40% ETO

60% ETO

Sabal Minor Palm

0% ETO

20% ETO

40% ETO

60% ETO

Daylily

0% ETO

20% ETO

40% ETO

60% ETO

Sago Palm

0% ETO

20% ETO

40% ETO

60% ETO

Fall Aster

0% ETO

20% ETO

40% ETO

60% ETO

Thyrallis

0% ETO

20% ETO

40% ETO

60% ETO

Asiatic Jasmine

0% ETO

20% ETO

40% ETO

60% ETO

Discussion

- 40% ETo and 60% Eto plots have similar appearance values over the study period
- 0% Eto appearance values have much lower value appearances than 20% Eto
- Correlation between Soil Moisture and Appearance
- Plant Performance Index comparing plants by drought survivability

Implications

- Water conservation education to general public
- Phase II– recovery of plants under no additional irrigation
  - Monitor increase or decrease in appearance values
- Influence of policy decisions related to urban landscaping

Thank you!

Questions?

Amy Uyen Truong
Extension Assistant
Institute of Renewable Natural Resources
Amy.truong@tamu.edu

Forrest Cobb
Research Assistant
Institute of Renewable Natural Resources
forrest.cobb@ag.tamu.edu