DISCLAIMER

This project was conducted with financial assistance from a grant from the Metropolitan Water District of Southern California (Metropolitan) and the Southern California Gas Company through Metropolitan's Innovative Conservation Program (ICP). The ICP provides funding for research to help document water savings and reliability of innovative water savings devices, technologies, and strategies. The findings of this project, summarized in this report, are solely from the project proponent.

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Establishing real-world water use and irrigation cooling benefits baselines for 18 landscape species in inland southern California

ICP Recipient Name: Amir Haghverdi (PI)

Introduction

Sustainable urban landscape irrigation under a changing climate in semi-arid inland southern California requires identifying drought/heat tolerant plant species and irrigation management scenarios that maximize water saving while minimizing the urban heat island effect. This project will address these major knowledge gaps for moving toward sustainable landscape irrigation management in the region. This project also creates a pathway toward autonomous efficient irrigation management in our smart cities in the future, where smart controllers will apply the right amount of water to each plant species. The research team will run several irrigation trials and use already collected data from our previous field experiments to (I) compare the response of 18 irrigated landscape species to various irrigation management scenarios, (II) Identify drought and heat-tolerant species with aesthetic acceptability to the public that can maintain their cool canopy under limited irrigation and (III) build statistical models and an easy-to-use web page for irrigation management of the selected species.

Trials I & II: Buffalograss and St. Augustine turfgrass trials:

For 2023, the growing season was from May 19 to October 17. We imposed twelve treatments in a factorial, completely randomized block design: six irrigation levels (104-, 90-, 77-, 65-, 51-, 39-% in Buffalograss, and 100-, 87-, 74-, 62-, 50-, 38-% in St Augustine grass of reference evapotranspiration, ET_o), and two irrigation frequencies (three days/week or three d/wk and six days/week or six d/wk). The three-day-week irrigation frequency represents the outdoor irrigation restriction, while the six-day-week irrigation frequency represents the "on-demand" approach.

The turfgrass Visual Rating (VR) followed a general declining trend throughout the growing season, but the trend was more apparent in lower irrigation rates. Despite the decline in VR, irrigation of 104-90 $\%ET_o$ in Buffalograss and 100-87$\%ET_o$ in St. Augustine grass maintained the VR above six throughout the entire period except for exceptional dates, a phenomenon that could be attributed to the impacts of mowing. There was also significant variation in VR among irrigation rates, with relatively higher VR for higher irrigation rates, but the variation within irrigation frequencies was not substantial. For Buffalograss, Analysis of Variance (ANOVA) results showed strong evidence (P value <0.05) that VR was impacted by

irrigation rate, time of data collection, and their interactions. However, the impact of irrigation frequency was not significant. Also, for St. Augustine grass, only the effects of irrigation rate, time of data collection, and their interactions were statistically significant.

Like VR, NDVI followed a declining trend that was more apparent at lower irrigation rates. There was significant variation in NDVI among irrigation rates, but the variation within irrigation frequencies was insignificant. The ANOVA results showed strong evidence that irrigation rate and time of data collection significantly affected NDVI in Buffalograss. However, the impact of irrigation frequency was not statistically significant except for its interaction with irrigation rate. For St. Augustine grass, however, the effect of irrigation rate, time of data collection, irrigation frequency, and their interactions were statistically significant.

Additionally, there was also a strong relationship between VR and NDVI. For Buffalograss, the minimum NDVI corresponding to acceptable VR (6) was 0.45. For St. Augustine grass, the minimum NDVI corresponding to acceptable VR (6) was 0.59.

Canopy and air temperature differential (ΔT) followed a bell-shaped trend with the peak in the middle of the growing period, in July and August. For both Buffalograss and St Augustine grass, none of the irrigation rates maintained the canopy and air temperature differential below the threshold (zero) for the entire growing period. There was also substantial variation in ΔT across irrigation rates and frequencies, where high irrigation rates had relatively lower ΔT. For Buffalograss, the ANOVA results showed that the impact of irrigation rate and time of data collection on ΔT were statistically significant. However, the irrigation rate and frequency effect were statistically significant for St. Augustine grass.

Trials III & IV: Groundcover irrigation trials:

In 2023, the NDVI values varied from 0.56 to 0.73 for *Acacia redolens*, from 0.20 to 0.51 for *Arctotis Acaulis*, from 0.38 to 0.55 for *Chrysanthemoides incana*, and from 0.32 to 0.71 for *Lippia nodiflora*. The irrigation levels showed no significant effect on NDVI values of *Acacia redolens*, *Arctotis Acaulis*, and *Chrysanthemoides incana*. However, irrigation quantity showed a significant effect on NDVI values for *Lippia nodiflora* ($p < 0.01$), with the highest mean NDVI value of 0.65 for 100% ET_o and the lowest mean NDVI value of 0.46 for 25% ET_o. NDVI values did not change significantly over time and followed the same pattern with minimum deviation across all irrigation treatments found for *Acacia redolens* and *Chrysanthemoides incana*. NDVI of *Arctotis Acaulis* constantly decreased from early May to late August to reach a constant value below 0.3 for all irrigation levels. The differences between measured NDVI for

Lippia nodiflora across irrigation treatments became more pronounced with an increase in air temperature from late June, reaching a maximum by mid-August. Due to heavy rainfall in late August (48.80 mm), *Lippia nodiflora* recovered from deficit irrigation treatments (25% and 51% ET_o) with an increase in NDVI value.

Acacia redolens exhibited the best cooling effect with a canopy temperature of 20 to 30.7 ˚C corresponding to the canopy - air temperature (ΔT) of -10.90 to -0.79 ˚C for all irrigation levels in 2023. The highest temperature difference between maximum and minimum canopy temperature was observed for *Lippia nodiflora*, corresponding to 43.7 and 24.3 ˚C (ΔT values of 7.2 and -5.2 ˚C, respectively). Irrigation levels did not significantly impact canopy temperature values for any of the groundcovers.

The fluctuation in visual rating (VR) values over time was close to the NDVI pattern for all groundcovers. *Acacia redolens* and *Chrysanthemoides incana* maintained their visual quality greater than 8 over time with correlation coefficient (r) values between NDVI and VR of 0.59 and 0.29, respectively. A strong correlation (r = 0.89) between NDVI and VR was found for *Lippia nodiflora* and *Arctotis Acaulis,* with VR values greater than 6 for the top three irrigation levels (100, 75, and 51% ET_o) over time. The irrigation level showed a significant impact only on VR values of *Lippia nodiflora* ($p < 0.05$).

The 2023 Buffalograss and St. Augustine turfgrass trials

Pictures showing St Augustine and Buffalograss plots, capturing canopy photos using an Unmanned Air Vehicle (UAV), and measuring CO_2 flux using LI8100.

Fig. 1. A photo taken on May 9, 2023 showing research plots

Acacia redolens

Arctotis Acaulis

Chrysanthemoides incana

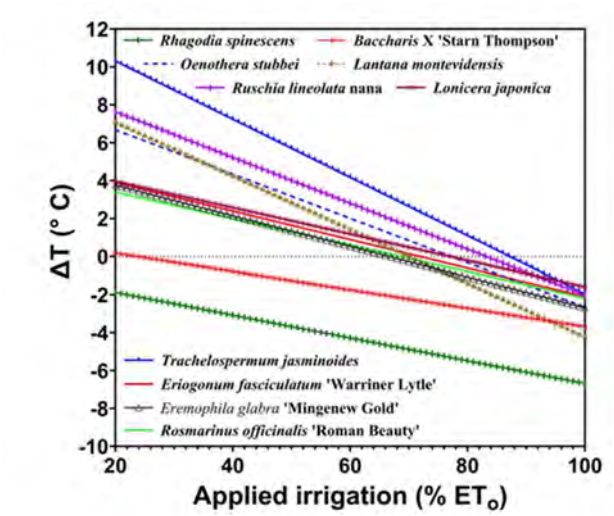
Lippia nodiflora

Fig. 2. Canopy pictures with scientific names of groundcover species selected in this study.

Fig. 3. Weathermatic ET-based smart irrigation controller (left) and infrared radiometer for canopy temperature measurement (right)

We developed a webpage (https://www.ucrwater.com/landscape-irrigation.html) to share science-based landscape irrigation management information developed by our group for inland southern California. We used our field data and statistical models to determine the irrigation recommendations for each species based on long-term average weather conditions in our region. These irrigation levels can be implemented in smart ET-based controllers as plant factors (landscape crop coefficients) to automate irrigation scheduling. The irrigation and cooling potential information provided for each species in the website follows.

Scientific name: *Rhagodia spinescens*
Common name: Creeping Australian Saltbush
Origin: Australia
Minimum Summer Irrigation: 20-25% ET_o (under full sun)
Cooling potential under deficit irrigation: High



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

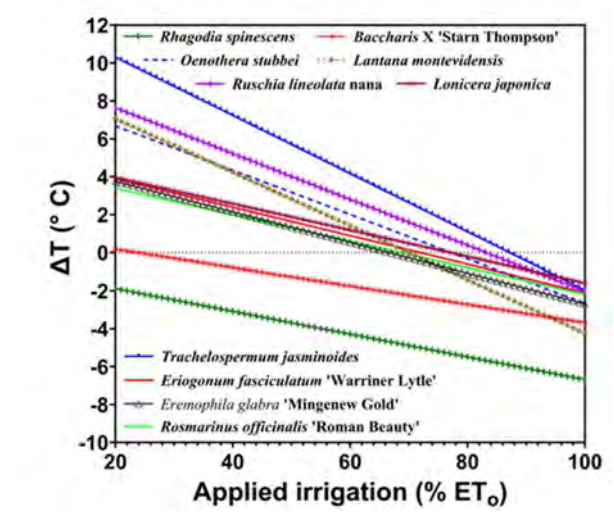
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Baccharis* x 'Starn' Thompson
Common name: Coyote Bush
Origin: USA
Minimum Summer Irrigation: 25-30% ET_o (under full sun)
Cooling potential under deficit irrigation: High



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

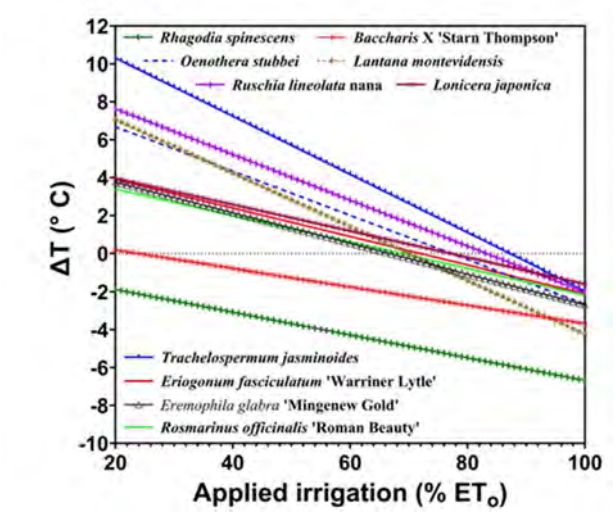
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Eremphila glabra* 'Mingenew Gold'
Common name: Gold Ema Bush
Origin: Australia
Minimum Summer Irrigation: 40-50% ET_o (under full sun)
Cooling potential under deficit irrigation: Average



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

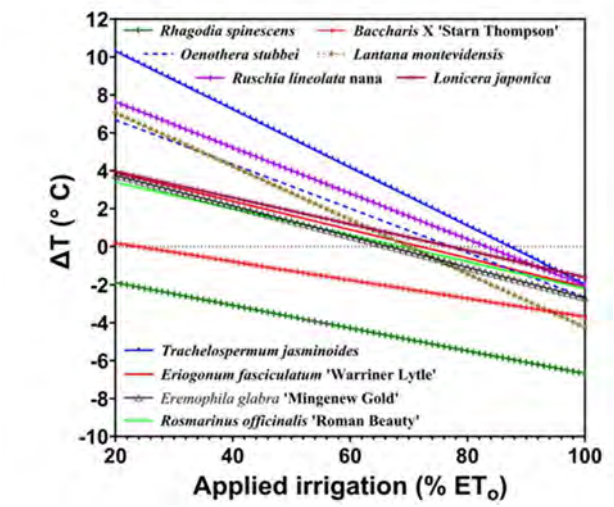
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Lonicera japonica*
Common name: Honeysuckle
Origin: Asia
Minimum Summer Irrigation: 60% ET_o (under full sun)
Cooling potential under deficit irrigation: Average



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

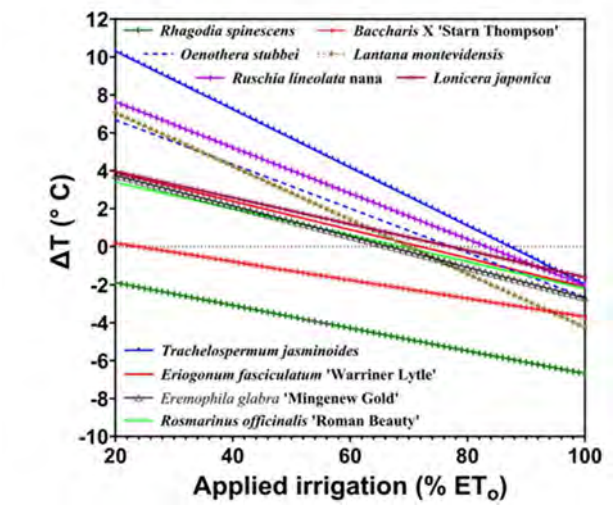
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Ruschia lineolate* nana
Common name: Ice Plant
Origin: South Africa
Minimum Summer Irrigation: 40% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

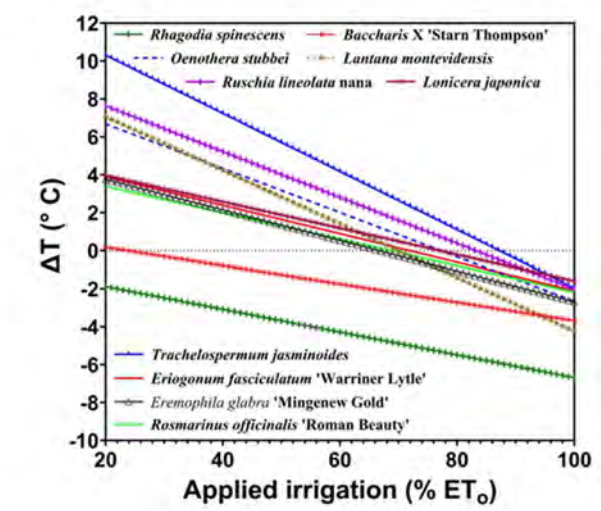
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: --

Scientific name: *Trachelospermum jasminoides*
Common name: Jasmine
Origin: China
Minimum Summer Irrigation: 50-60% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

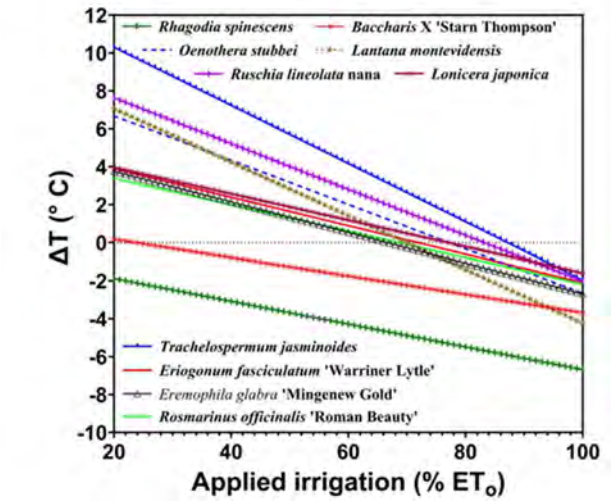
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Lantana montevidensis*
Common name: Lantana
Origin: South America
Minimum Summer Irrigation: 60% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

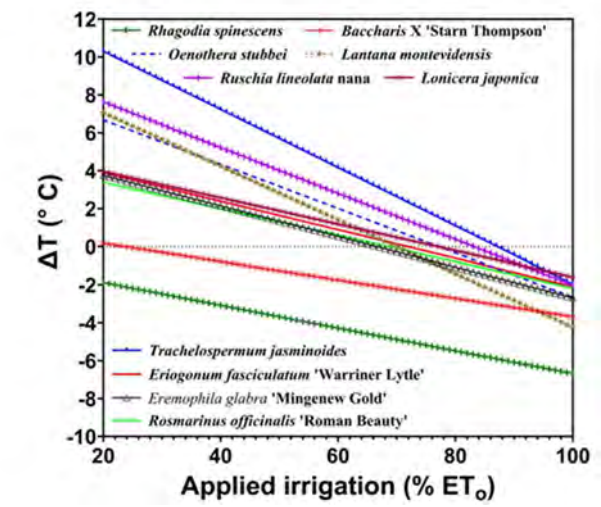
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Rosmarinus officinalis* 'Roman Beauty'
Common name: Rosemary
Origin: Mediterranean
Minimum Summer Irrigation: 40% ET_o (under full sun)
Cooling potential under deficit irrigation: Average



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

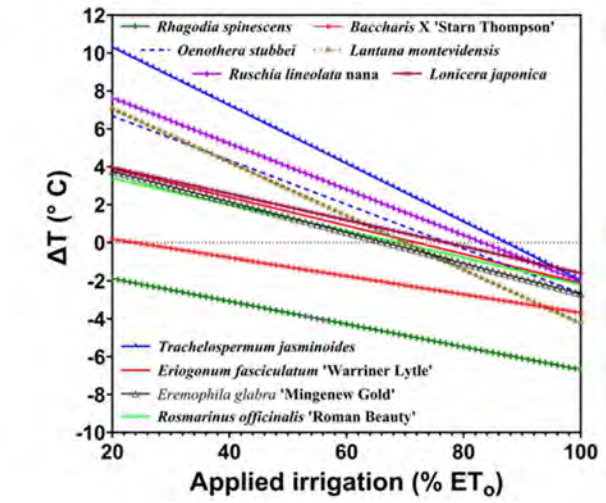
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Oenothera stubbei*
Common name: Saltillo Evening Primrose
Origin: Mexico
Minimum Summer Irrigation: 40% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

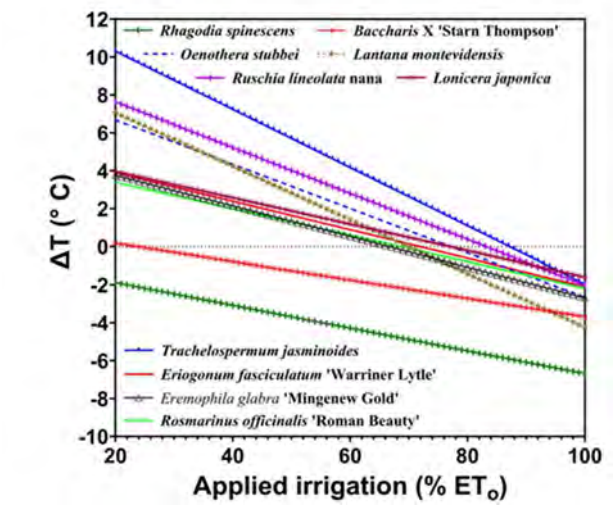
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Eriogonum fasciculatum* 'Warriner Lytle'
Common name: Buckwheat
Origin: USA
Minimum Summer Irrigation: 20% ET_o (under full sun)
Cooling potential under deficit irrigation: High



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

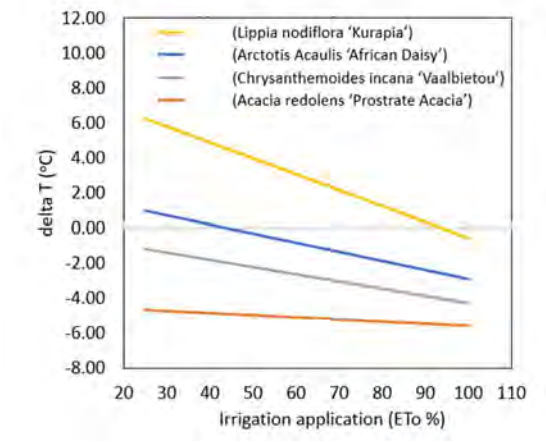
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 86%

Pruning height: 15 inches

Scientific name: *Acacia redolens* 'Low Boy'
Common name: Prostrate Acacia
Origin: Australia
Minimum Summer Irrigation: 20% ET_o (under full sun)
Cooling potential under deficit irrigation: High



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall Hunter PROS-12-PRS30 quarter-circle pop-up heads (Hunter Industries, Inc., San Marcos, CA) with Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

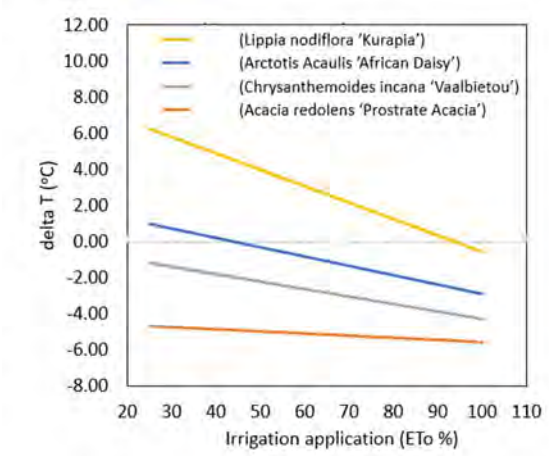
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 79%

Pruning height: --

Scientific name: *Arctotis Acaulis* 'Big Magenta'
Common name: African Daisy
Origin: South Africa
Minimum Summer Irrigation: 50% ET_o (under full sun)
Cooling potential under deficit irrigation: High



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall Hunter PROS-12-PRS30 quarter-circle pop-up heads (Hunter Industries, Inc., San Marcos, CA) with Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

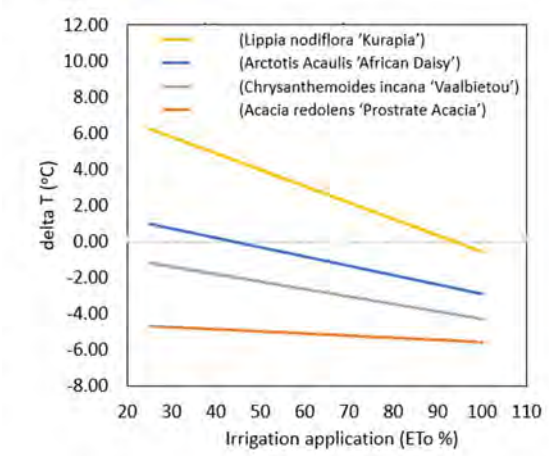
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 79%

Pruning height: --

Scientific name: *Chrysanthemoides incana*
Common name: Vaalbietou
Origin: South Africa
Minimum Summer Irrigation: 30% ET_o (under full sun)
Cooling potential under deficit irrigation: Average



Study area: Riverside, California (UCR pAgricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall Hunter PROS-12-PRS30 quarter-circle pop-up heads (Hunter Industries, Inc., San Marcos, CA) with Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

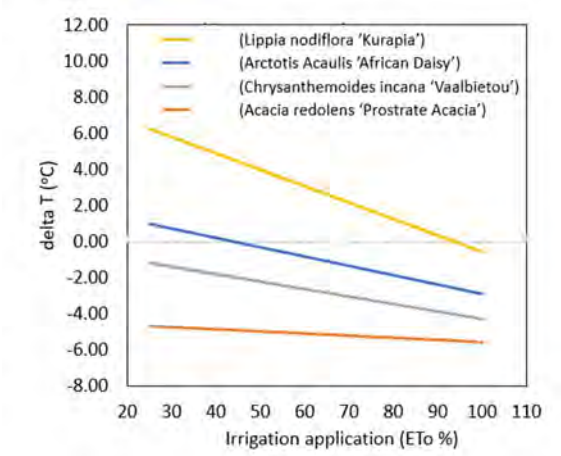
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 79%

Pruning height: --

Scientific name: *Lippia nodiflora*
Common name: Kurapia
Origin: Japan
Minimum Summer Irrigation: 60% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2019 | **Irrigation trial:** 2020-2021 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 12-inches tall Hunter PROS-12-PRS30 quarter-circle pop-up heads (Hunter Industries, Inc., San Marcos, CA) with Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

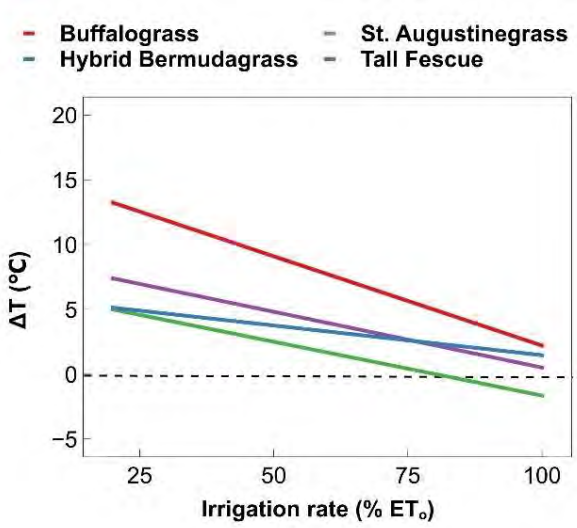
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3-4 days per week

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 79%

Pruning height: --

Scientific name: *Cynodon dactylon* (L.) Pers. × *C. transvaalensis* Burtt-Davy
Common name: hybrid bermudagrass
Cultivar: 'Tifgreen'
Minimum Summer Irrigation: 75% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2017 | **Irrigation trial:** 2017-2019 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 4-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

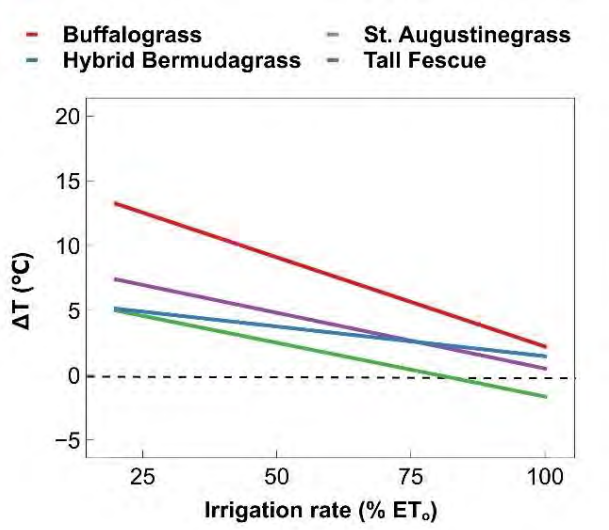
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: Various watering days

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 77-81%

Mowing height: 0.5 inches

Scientific name: *Festuca arundinacea* Schreb.
Common name: Tall fescue
Cultivar: 'Westcoaster'
Minimum Summer Irrigation: 100-110% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2017 | **Irrigation trial:** 2017-2019 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 4-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

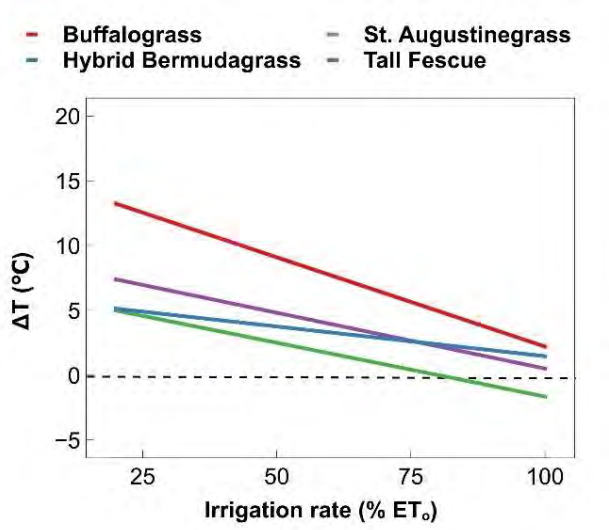
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: Various watering days

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 77-81%

Mowing height: 1.75 inches

Scientific name: *Buchloe dactyloides* (Nutt.) Engelm.
Common name: Buffalograss
Cultivar: 'UC Verde'
Minimum Summer Irrigation: 80-90% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2020 | **Irrigation trial:** 2021-2023 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 4-inches tall quarter-circle pop-up heads (Toro 570Z series; The Toro Company, Bloomington, MN, USA) with pressure-compensating precision series spray nozzles (Model 0-10-Q, The TORO Company), Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

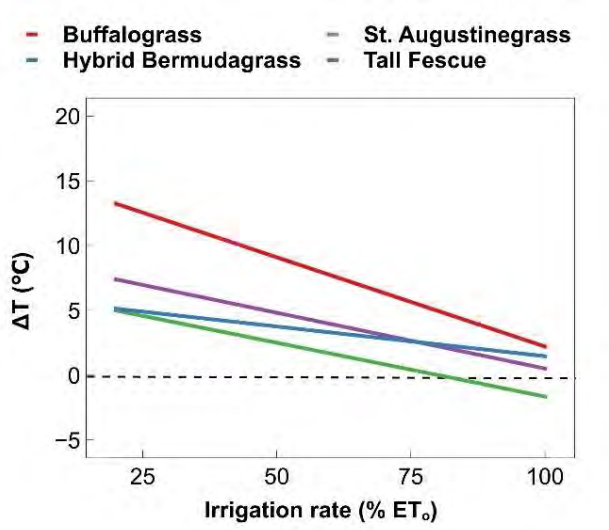
Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: Various watering days

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 81%

Mowing height: 2 inches

Scientific name: *Stenotaphrum secundatum* (Walt.) Kuntze
Common name: St. Augustinegrass
Cultivar: 'A-G'
Minimum Summer Irrigation: 60-70% ET_o (under full sun)
Cooling potential under deficit irrigation: Low



Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2021 | **Irrigation trial:** 2022-2023 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: 4-inches tall quarter-circle pop-up heads (Hunter Pro Spray PRS30CV; Hunter Industries, San Marcos, CA, Hunter PGV-101G solenoid valve (Hunter Industries, Inc., San Marcos, CA)

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: Various watering days

Irrigation Efficiency (Low half distribution uniformity based on catch-cans test): 83%

Mowing height: 2 inches

Scientific name: Aloe 'Rooikappie'
Common name: Little Red Riding Hood Aloe
Origin: South Africa
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Delosperma cooperi
Common name: Purple Ice Plant
Origin: South Africa
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Achillea millefolium 'Paprika'
Common name: Paprika Yarrow
Origin: Circumboreal
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Ceanothus griseus var. horizontalis 'Yankee Point'
Common name: Yankee Point Ceanothus
Origin: California Native
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Carex praegracilis
Common name: California Field Sedge
Origin: Native California
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Cistus skanbergii
Common name: Pink Rockrose
Origin: Greece
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Rosa cv. Flower Carpet
Common name: Flower Carpet Rose Red
Origin:
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches

Scientific name: Festuca idahoensis 'Siskiyou Blue'
Common name: Siskiyou Blue Fescue
Origin: California native
Minimum Summer Irrigation: Data will be available in 2025
Cooling potential under deficit irrigation: Data will be available in 2025

Study area: Riverside, California (UCR Agricultural Experiment Station)

Plot establishment: 2023-2024 | **Irrigation trial:** 2025-2026 (May-October):

Soil type: Hanford coarse sandy loam

Irrigation system: Pop-up sprinkler and surface drip

Irrigation scheduling: Automatic by a Weathermatic SmartLine SL4800 smart controller

Watering days: 3 days per week

Irrigation Efficiency --

Pruning height: 15 inches