## Project Number
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# Using Surfactants in Optimizing Water Usage on Turfgrasses

**Principle Investigator:**
Sowmya Mitra, Ph.D., *California State Polytechnic University, Pomona, California*

**Cash Contributors (in addition to the Bureau of Reclamation):**
State Water Resources Control Board (CA)

**Objectives:**

- To observe any adverse effects of recycled water on turfgrass color and quality
- Study any changes in soil chemical properties like cation exchange capacity (CEC), electrical conductivity (EC), total dissolved solids (TDS), heavy metal accumulation
- Any changes in tissue chemistry will also be evaluated
- Observe changes in turfgrass physiology like cholorphyll synthesis, clippings yield, turf density, seedhead production etc.
- Stress enzymes like superoxide dismutase, catalase and proline synthesis in turfgrasses irrigated with potable and recycled water will also be studied.

**Abstract**
The quantity and quality of irrigation water are limiting factors in maintaining high-quality turf grasses for landscapes and golf courses in Southern California. The incorporation of a surfactant (wetting agent) in the irrigation protocol is being encouraged in order to conserve irrigation water. Wetting agents are organic polymers, which can be injected into the irrigation lines in order to reduce water usage on landscapes and golf courses. Wetting agents help retain water in the soil profile for a longer period of time, and hence can increase the time in between irrigation cycles.

The objective of this research project was to evaluate three different surfactants and their interaction with two different water sources. The experiments were carried out in plots at the C-TILT (Center for Turf Irrigation and Landscape Technology); "California State Polytechnic University, Pomona. Twenty-four plots (3m by 3m) were laid out in a split-plot design, with three replicates. Each individual plot was irrigated separately, and water meters were installed on-line. During the experiment, twelve plots were irrigated with potable drinking water and twelve with recycled water. Irrigation-water quality (potable or recycled) was the primary factor and three different surfactants formed the secondary factor. Bermudagrass (GN-1) was sodden and maintained under golf-course fairway management conditions. The three different surfactants (Irrigaid at 1753 mL/hectare every two weeks, Dispatch and ACA 1897 at 877 mL/hectare every week) were injected into the irrigation lines. Volumetric moisture content (VMC) was measured with a "Time Domain Reflectance - TDR" probe at randomly selected spots and an automated "Time Domain Transmission - TDT" device measuring every hour after injection at 20 cm below soil surface. The experiments were started in May 2003, and the plots were irrigated at 100% of the reference evapotranspiration (ETo) for that month. In June, the amount of water was reduced to 70%ETo followed by a further reduction to 30%ETo in July.

Finally in August, the plots were irrigated at 10%ETo to induce moisture stress. Generally, all surfactant treatments helped retain more moisture compared to the untreated plots. There was no significant difference in soil temperature between all the treatments. Under moisture stress (10%ETo), all surfactant treatments resulted in higher volumetric moisture levels. Values resulting are given in the paper text.