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REFINEMENT OF URBAN LANDSCAPE WATER REQUIREMENTS

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Background

The UC DANR Landscape Workgroup initiated a statewide field research project at multiple sites to refine estimates for the minimum quantity of irrigation required by commonly used landscape plant species. This report summarizes the progress made at the Coachella Valley site (low desert area) located in UC Riverside's Coachella Valley Agricultural Research Station (CVARS) near Thermal, California. It is one of the key locations participating in the Workgroup's statewide project.

Introduction

There is limited experimental research on the quantitative water needs of landscape plant materials. Most of the existing information on this subject is based largely on observation rather than scientifically obtained data. From the few quantitative field research studies reported, the findings show that several widely used landscape plant species maintain their aesthetic and functional value (not necessarily their optimum performance) when irrigated within a range of 18% to 80% of reference evapotranspiration (ETo) (Pittenger et al.,

1990, 2001, and 2002; Pittenger and Shaw, 2004; Shaw and Pittenger, 2004; Staats and Klett, 1995).

In order to conserve water effectively, homeowners, landscape contractors, water agencies, and others need accurate information concerning the minimum water that commonly used woody and herbaceous perennial plant species need in order to provide their intended landscape function. In response to this situation, the UC DANR Landscape Workgroup recently initiated a statewide field research project designed to refine the minimum quantity of irrigation required for commonly used landscape plant species. This project, using a standardized protocol among the sites, will fill gaps in the knowledge about the applied water lower limit thresholds of plant species widely used in landscapes across the state, replace or refine current 'guesstimates' of plant's minimum water needs, and supply sound research findings to support the implementation of effective landscape irrigation best management practices (BMPs). As part of the landscape Workgroup's statewide project, it was important to establish a research site in the low desert area of California since it represents a unique climate zone and is urbanizing rapidly.

Objectives of the statewide research project and at this particular site are to:

1. Refine the minimum quantity of irrigation required for several commonly used landscape plant species to maintain their aesthetic and functional value.
2. Develop scientific, reference evapotranspiration based irrigation information that can be used to develop effective landscape water conservation techniques and BMPs.
3. Determine the effect of reduced irrigation on the growth of selected shrubs.

Methods and Materials

In keeping with the DANR Landscape Workgroup's statewide project protocol, a 0.36 acre plot at CVARS was planted in 2004 and 2005 and plots are now established with the following 10 plant species:

Agapanthus orientalis, Aptenia cordifolia, Dodonea viscosa 'Purpurea', *Juniperus chinensis* 'Sea Green', *Lantana montevidensis, Ligustrum japonicum* 'Texanum', *Photinia* x *fraseri, Raphiolepis indica* 'Ballerina', *Senna nemophila*, and *Trachelospermum jasminoides*.

A previous attempt to establish plots of *Hemerocalis* x 'Stella de Oro' and *Rosa* x 'Flower Carpet' were unsuccessful, so these species were removed from further consideration at this study location.

The experimental design is a split-plot in a randomized complete block with four blocks (replicates). Main plot treatments are the four irrigation levels and sub-plots are the 10 plant species, which creates 160 sub-plots (4 irrigation treatments x 4 replicates x 10 species). Each sub-plot is 10 ft. x 10 ft. planted with 4 to 9 plants depending on the species.

The irrigation system consists of a single full-circle shrub spray head in the center of each 10 ft. x 10 ft. sub-plot. The irrigation system has a measured distribution uniformity of

>80% and a precipitation rate of 0.9 inches/hr. so that the water is distributed relatively evenly and slowly to the planted area of each sub-plot.

In the spring of 2006, four irrigation treatments will be implemented to the plant species at the following percentages of ETo: 80%, 60%, 40% and 20%. The implementation of treatments will be coordinated with the other study sites in the statewide project.

Data on plant performance will be collected in one of two ways depending on the species. For all species the quality of sub-plot aesthetic appearance will be rated monthly on a scale of 1 to 9, with 9 = optimal plant quality, 5 = minimally acceptable appearance, and 1 = dead/worst plant quality. Performance of *Dodonea, Juniperus*, *Ligustrum, Photinia, Senna,* and *Raphiolepis* will be evaluated using the above rating system, plus annual growth of plants within a sub-plot will be characterized by calculating a mean plant growth index (GI) as follows: [$Width_1$ + $Width_2$ + Height] ÷ 3 = GI. Weight of prunings required to maintain shrub height at one meter will replace the GI measurement when shrubs mature.

Data from the site will be summarized, statistically analyzed, and submitted for inclusion in the statewide project's summary. Separate publications reporting results solely from this study site will also be prepared and disseminated as discussed below.

Expected Outcomes

The research-based knowledge derived from this study along with the other sites in the statewide project should be valuable to the agencies and organizations formulating landscape water conservation BMPs and water policy. If the study's findings document acceptable plant performance can be maintained under reduced irrigation as a percent of ETo, then landscape managers will be able to dramatically reduce the amounts of landscape irrigation water applied in the low desert region as well as throughout California. Changes in the attitudes and skills of homeowners and landscape professionals could occur since ETo-based irrigation scheduling is gaining acceptance by the industry. Documented reduction of green waste because of reduced urban landscape irrigation is also expected.

Study results will be extended to urban residents, landscape contractors, water agencies, and related clientele through a variety of methods, including educational programs for UC Master Gardeners, water agency personnel, and landscape management professionals, plus articles in trade journals, UCCE web sites and other appropriate outlets.

Literature Cited

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