**Report of progress on FNGLA grant.titled:**
**Protocol for Water Needs of Shrubs during Establishment**

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Water is a vital part of every aspect of the human life, preserving and managing it has become a challenge for every industry, including the landscaping industry. It not clear how much water shrubs need to be established in the landscape or how long it takes for them to become established. It is thought that it takes about 4 to 6 months to establish a 3-gallon shrub with modest irrigation management, but this is just an estimate and many factors play a role in how much water is required for establishment. Thus, the objective of this project is to determine how much irrigation is needed to establish and maintain shrubs installed in Florida landscapes.

This project seeks to determine the impact on irrigation needs of newly planted shrubs of: 1) season of the year, 2) irrigation frequency, 3) location in the state, and 4) plant type. Furthermore, the project seeks to correlate location in Florida and irrigation frequency with evapotranspiration to develop models for calculating water budgets for shrub establishment.

For the fulfillment of these questions the experiment has been designed with statistical validity as a complete randomized block design with:

**Four seasons of the year:** Shrubs will be planted Sept 2004, Dec 2004, Mar 2005, June 2005, Sept 2005, Dec 2005, Mar 2006, and June 2006. The study will run for two consecutive years to see if we can repeat results from year one. This phase of the project will take three years to account for plant establishment rate, experimental design, project set up, and report preparation.

**Four irrigation frequencies**: 1) every 2 days; 2) every 4 days; 3) every 7 days; 4) daily for two weeks, then every 2 days for 2 weeks, then every 4 days for 4 weeks then once weekly until established. Irrigation will continue for one month after shrubs are established, then irrigation will be discontinued on that treatment.

**Four locations in the state:** The study will be conducted at four locations: Fort Lauderdale Research and Education Center, Gulf Coast Research and Education Center in Balm, Mid-Florida Research Center in Apopka, and Plant Science Research Center in Citra. About 2 acres are reserved for this project at each location.

**Three plant types:** *Viburnum odorotissimum* will be used at all four sites, while *Ilex cornuta* 'Burfordii Nana' and *Pittosporum tobira* will be used for Balm, Apopka, and Citra, and *Psychotria nervosa* and *Murraya paniculata* 'Lakeview' for Fort Lauderdale.

To evaluate when newly installed plants are established six indicator plants have been installed October 2003 at each of the four sites of each of the species. These plants are irrigated regularly and have been mulched with 3-inch thick layer of pine bark and fertilized as described below. One plant of each species received no irrigation at the Citra site after March 2004. Seven weeks went by without rainfall and none of the shrubs died back during spring 2004. This could indicate that they are established 5 months after planting. Irrigation on all indicator plants was discontinued June 2004.

The irrigation design has been prepared to deliver water through three drip emitters to each individual plant. Flow meters are placed at the head of each irrigation treatment and down the line will be the solenoid valves at the head of each irrigation line, followed by a pressure regulator (15 psi). The Antelco® Shrubbler 360 spray emitter was chosen for delivering irrigation because calibration tests showed that it delivered a uniform spray pattern and remained calibrated.

The fertilizer to be used is Lesco Southern Ornamental Landscape Fertilizer (12-2-14) and it will be applied four times a year at each planting time at a rate of 1 lb of nitrogen/1000 square feet applied to a 9 sq. ft. area around each plant.

**Additional Information**

Concurrent with the objectives identified in the grant, the following two experiments have begun:

Study one - A study was planted under a rain-out shelter in a similar configuration as laid out in the proposal at the Mid-Florida Research Center in Apopka. The purpose of this controlled study is to determine the behavior of the three experimental plants under three irrigation regimes and to understand the behavior on water potential during establishment. The protocols for this experiment are as follows:

3 species **:***Ilex cornuta* 'Burfordii'
*Pittosporum tobira* 'Variegata'
*Viburnum odorotissimum*

3 irrigation regimes**:** 9 liters applied per plant every 2, 4 or 7 days.

Experimental design**:** Randomized complete block design with 3 irrigation treatments x 3 species x 4 reps (blocks) = 36 plants.

Parameters to measure**:**

A. Water potential

- Water potential readings taken at dawn, mid-day, and dusk on day 28 and 29 of the irrigation cycle, which corresponds to the day of maximum and minimum water stress.
- Diurnal water potential readings will be taken monthly.

B. Growth index

- Measurements of average canopy height, widest canopy width, and the width perpendicular to the widest width will be recorded to determine growth indices.

C. Root:shoot ratios

- To calculate root to shoot ratios, leaves of each sample will be removed, leaf area determined, and leaf dry mass recorded.
- Roots will be severed from the stem, soil will be removed, and stem and root dry mass recorded.

D. Landscape quality

- A rating scale will be used to visually assess landscape quality.

Planting date**:** The week of May 15th.

Study duration**:** Until all three species are established as indicated by dawn and dusk water potentials registering within one bar of one another.

Study two – This experiment was planted May 2004 at the Plant Science Research Center in Citra. The purpose of this experiment is to determine the irrigation volume most appropriate at every watering. The protocols for this experiment are the same as above, except the irrigation regimes and experimental design. These are as follows:

6 irrigation regimes**:** 3, 6, or 9 liters applied per plant every 2 or 4 days.

Experimental design**:** Randomized complete block design with 6 irrigation treatments x 3 species x 5 reps (blocks) = 90 plants.

Summary: This work will continue for several years provided funding continues. We are just beginning this project with many more results coming in the following years.