BACKGROUND AND RATIONALE

Late in the summer of 2009, a group of water industry leaders invited licensed irrigators, irrigation equipment manufacturers and distributors, Texas AgriLife Extension Service Agents, state and national water conservation experts, Texas A&M Turfgrass specialists, Extension Master Gardener volunteers, MUD officers, engineers and operators to a “workshop” to address the persistent issue of “How much water is enough for my Texas lawn?”

As the meeting progressed, conversations kept coming back to the need for research-based data on how much water is needed to sustain an attractive and healthy residential turf area. One response has been that an inch of water a week -- by rainfall or irrigation -- is the right amount. Others argue that even that is more than is really needed to sustain Texas turf.

The Task Force recognized two important things: 1. That frequency and duration are the essential irrigation functions for homeowners to understand if they are to apply the correct amount of water to establish a healthy lawn; and 2. That it is equally important for water providers (MUDs and Authorities) to be able to explain to their users that they can water efficiently with less water...without sacrificing the desired appearance.

Local research – obtained through a series of residential irrigation system evaluations – demonstrated unequivocally that homeowners over-water their grass; in fact, the evaluations revealed that most residential irrigation systems are set to run 3 days a week...or more. When asked, homeowners explained they believe that their irrigation systems must run more than three days a week in order to sustain the desired landscape. This response validated the need for research-based irrigation usage facts upon which to base “efficient use” messages and consumer outreach efforts.

In search of an answer that can be supported by solid, replicated research, a Task Force was created to acquire critical data that would be consistent and accurate enough to support irrigation usage recommendations by water suppliers. The group, primarily composed of irrigation specialists and Texas A&M University System (TAMU) representatives, met at the Texas A&M Turfgrass Research Facility in College Station.

Dr. David Chalmers, Texas AgriLife Extension professor and co-author (with Dr. James
McAfee) of _Turfgrass Selection for Texas and Turfgrass Establishment for Texas_, informed the group that as the University continued to grow, their current research building and research fields -- situated on future building sites -- needed to move. They had already established their new research site, but needed help completing the new irrigation system, according to Chalmers. He asked the Task Force members present (three irrigators -- representing the Houston Gulf Coast Irrigation Association [HGCIA] -- and representatives of an irrigation manufacturer) what it would take to complete their irrigation system and if collaboration was possible to accomplish this.

_Doug Goodwin, left, former chair of the TCEQ Irrigators Advisory Council and HGCIA board member, talks with James C. Thomas, Department of Soil and Crop Sciences, College of Agriculture and Life Sciences Texas A&M University, about the project._

The HGCIA Board members visited the site, evaluated what irrigation system equipment needed to be installed to complete the project, and agreed that inviting funding participation from the groups represented at the initial roundtable discussion was a viable way to finish the assignment. HGCIA agreed to raise the money necessary to complete the installation of their irrigation system, and invited sponsorship/participation by the irrigation manufacturers to
help supply some of the missing parts.

In return for helping to underwrite the costs of this University project, a generous section of land was designated for the task force to use for additional research opportunities to quantify frequency and duration of irrigation system usage under controlled comparisons. The TAMU Soil and Crop Science Department’s Turfgrass Research Facility Development Committee in charge of the site has provided six 50’ x 50’ test plots, and another area of approximately 30’ x 500’ for Task Force research and consumer education about irrigation options for a typical southeast Texas home.

Raw land at Texas A&M, Bryan College Station, before plotting and installing comparison irrigation systems and turfgrass.
Providing funding for the research project were: the North Harris County Regional Water Authority, the West Harris County Regional Water Authority, the North Fort Bend Water Authority, The Woodlands Joint Powers Agency, the Houston Gulf Coast Irrigators Association, Cinco MUD 1, ______________, and Save Water Texas. The irrigation design was donated by Doug Goodwin of Irrigation Services; and the irrigation materials were donated by Hunter Industries, Texas Irrigation Supply, Lasco Fittings, WWIP Corporation, Cimarron Marketing, and AMC Industries. The St. Augustine and Common Bermuda sod was donated, delivered and installed by Mata Turf. The system’s irrigation mainline was installed, and the smaller mainlines to each test plot are also now complete. Coordination for the research project was handled by the Houston Gulf Coast Irrigation Association (HGCIA).

METHODOLOGY

*Installation of 50 x 50 plots*

Each 50’ x 50’ plot was divided in two sections; with half planted in St. Augustine grass and the other half planted with Bermuda grass. The water to the test areas is delivered by
spray heads, rotors, and rotating spray heads -- the most common irrigation heads utilized in residential and commercial landscapes in Texas.

Plot 2 – St. Augustine and Bermuda watered twice a week

According to Jay Hartley, HGCIA and project manager, “The grass got established over the winter, and our research activities began in earnest in the spring. This collaboration among a group of recognized experts in their respective fields enables us to agree upon some practical water conservation guidelines for residential irrigation that will allow homeowners to sustain attractive lawns AND avoid wasting water to keep them that way.”

One objective of these planting/watering comparisons was to demonstrate for a homeowner how the turfgrass planted in their yard -- Common Bermuda or St. Augustine -- will respond if watered 2 days a week versus 4 days a week. A second goal was to allow a visual comparison of the overall appearance of the grass in the plots relative to the length of time the
stations were allowed to run. For most homeowners, spray heads are usually set on 15 minutes per zone, and rotors are set on 30 minutes for the zones they water.

Here’s an example: If the homeowner’s yard has St. Augustine grass, with spray heads in the turf, then the test plots can confirm that watering for “X” amount of time, 2 days a week will produce turf that looks just as good as the plots that were watered for “X” amount of time, 4 days a week. These test plots are in full sun, totally without shade. So, since most homeowners have some kind of shade in their yard -- either in the grass or beds or both -- irrigation run times can be adjusted even lower due to less evaporation.

In this study, the equipment in the plots was duplicated exactly so any variance in appearance of the grass could not be the result of different equipment. With six plots with rotors, sprays, drip, and rotary nozzles, plots 4, 5, and 6 are installed to replicate plots 1, 2, and 3, so the frequency of irrigation running on one plot can be increased or decreased compared to the other plot... making a valid comparison possible.
The irrigation systems were complete in July 2010 and the sod was installed in August 2010. The grass was established over the winter, and, as is typical in South Texas, winter was over by last week in February. The research criteria for this first year was based on a “visual” indication of how the grass looked -- watered two days a week versus four days a week...and the length of run times. Root depths were taken and an audit was performed on three of the irrigation zones. Homeowners tend to set up their irrigation system based on how their grass looks and mistakenly set the system to water four or more days per week.

Even in this year’s record setting extreme heat and drought, the first three plots were watered two days per week, twice per night* and look the same as the plots that were watered four days per week, once per night. The turf spray plots were watered for 12 minutes, rotary spray areas for 45 minutes, and rotors for 30 minutes. In light of watering restrictions – some districts allowing only two days a week watering – the minimum watering schedules employed on the test plots demonstrate that a yard can thrive and stay being watered only two days a week. Using two watering cycles per night with a brief run time, permits the water to soak into the soil and is called “*Cycle and Soak”. Basically, if a homeowner runs the system for 15
minutes once per night, that is the same as 7 or 8 minutes, twice per night. Most of the soils in this region of the state are high in clay. To saturate clay soil, it will take approximately an 8 minute watering cycle. Any water applied after saturation just runs off and is wasted. Until now, there has not been any definitive research in our area to confirm that a yard can sustain a drought with water applied – by rain or irrigation -- two days a week.

Plot 3 – watered 4 days a week with the back and right side of the plot in drip irrigation

In May, the Turfgrass Research team was asked to set up the controllers starting off the program in anticipation of “normal” spring weather conditions. But the spring rains never came, and it was quickly apparent that we were going to need more water than what was planned. What happened between the middle of May to the middle of June, however, was completely unplanned and unexpected. During Jay Hartley’s visit to the site on Thursday June 9th, he noted that all of the plots looked virtually the same -- with the exception of the first plot that was a little stressed compared to the others.

Hartley met with Jim Thomas, who oversees the research center, and got a closer look at the plots. Both agreed that overall, the plots looked good and the research project was off to a
good start. Thomas then revealed that the *irrigation had been off since the middle of May – that was almost 4 weeks without any irrigation!* Due to a wiring problem, the irrigation system had not been operating. About an inch of rain had fallen toward the end of the four week period. But, even with only a minuscule amount of rain, the test plots looked great...confirming that Texas turfgrass doesn’t need much water to survive!

**Plot 6 – watered 4 days a week with drip irrigation in the front of the picture and to the right.**
TAMU TURFGRASS FIELD DAY

In October, 2011 the University held its Turfgrass Field day. Several hundred visitors attended and observed many different locations at the research site. The six plot research site was featured on one of the teaching stops, sharing information about how the program got started, methodology, and the goal of providing homeowner comparison goals of the plots. Participants were able to see for themselves that the plots having been watered 4 days a week appeared to be virtually identical to the ones watered two days a week.

SUMMARY

The project’s objective was to emulate a Southeast Texas Lawn watered two days a week with one watered four days a week. As it turned out, an equipment glitch that denied irrigation water being delivered for more than three weeks at the start of the project, effectively showed us that grass can indeed survive with just a little rainfall. During traditional weather patterns, irrigation is supposed to supplement rainfall -- but during this drought of record, the roles are
reversed with rainfall supplementing irrigation.

It is important that we continue to educate homeowners about the effects of overwatering -- not only from a finite resource standpoint, but for the health and sustainability of your landscape.

**Compacted clay soil – shallow roots that will not sustain the grass during drought**

According to Dr. Chalmers, “If you know a few simple facts, it isn’t all that difficult. First, throw out the “inch of water a week” advice. That may -- or may not -- prove to be the formula that will work for your lawn. Here’s a clue: water moves into most clay soils at a rate of about 0.09 inches per hour...not very fast. Irrigation systems, on the other hand, may apply water at a rate of 0.25 to 1.5 inches per hour or more. So... for efficiency, the irrigation controller should be set to apply only about 0.10 inch of water at a time. Applying water faster than a soil can absorb in one setting results in water moving across the soil surface, running into the gutter, and down the storm drain. Setting irrigation to repeat this type of cycle every few hours allows water to move into the soil.”
A picture is worth a thousand words: Great soil, “trained” by infrequent watering to grow deep roots for sustainability during a drought.