

Developing a Model Irrigation Dissemination Program for Homeowners

Charles Swanson, Extension Program Specialist-Landscape Irrigation
Texas A&M AgriLife Extension Service
2117 TAMU, College Station, Texas 77843-2117.

Guy Fipps, Professor & Extension Agricultural Engineer
Texas A&M AgriLife Extension Service
2117 TAMU, College Station, Texas 77843-2117.

Abstract. *Over the past 60 years, research and demonstration projects have shown that using evapotranspiration (ET) based irrigation schedules can save significant amounts of water. In urban settings, automatic irrigation systems typically are improperly programmed and “over-irrigate” (and waste) 20%-50% of the water applied. Many municipalities have struggled to develop outdoor water conservation programs to address these problems, with mixed results. This paper discusses an innovative approach for providing ET-based irrigation schedules.*

Keywords. *Landscape Irrigation, Irrigation Scheduling, Homeowners, Evapotranspiration*

TexasET Approach

The Texas Evapotranspiration (TexasET) Network was developed in 1994 by the Texas A&M Agrilife Extension Service in order to promote ET-based irrigation water management. The TexasET Network and website (<http://TexasET.tamu.edu>) is a collaboration of ET weather stations around Texas. Unlike other states which fund state-wide ET Networks, TexasET receives no State funding to maintain the network. The TexasET Networks operation depends upon local sponsors to purchase the weather stations and cover communication and maintenance costs, thereby limiting its coverage within Texas.

The TexasET website, in addition to providing daily summaries of reference evapotranspiration (ET_o) and weather data (temperature, relative humidity, solar radiation, wind speed and rainfall) contains tools to assist users in determining their irrigation requirements. These calculators are designed for home watering, turf and landscape irrigation, and crop irrigation (not to be discussed further in this paper).

Home Watering

The home watering tool is a simple calculator developed for homeowners. Once a location/weather station is selected the homeowner selects how much sunlight exposure their lawn receives choosing from full sun, part sun and shade. Then they select what type of turfgrass they have in their yard, choosing from Buffalo, Bermuda,

Zoysia and St. Augustine. In scientific terms these are all warm season turf grasses (most commonly found in Texas) whose plant water requirement is the same, but homeowners are given the choice since they may not know their turf is a warm season variety. Once these two factors are selected, a water requirement for the turf is calculated. Next the effective rainfall is calculated (if any) then subtracted from the water requirement of the turf to produce the irrigation requirement, in inches.

Turf & Landscape Irrigation

The turf and landscape irrigation tool takes calculating irrigation requirements a step further. Like the home watering calculator, the irrigator first selects his/her closest ET weather station. They then select their plant coefficient by choosing one of five different plant types including: warm season turf, cool season turf, frequent watering plants, occasional watering plants and natural rainfall type plants. Next an adjustment factor is chosen for the desired plant quality ranging from maximum to low. This assumes the irrigator is much more familiar with plant water requirements and is able to select the proper plant type and landscape conditions affecting plant quality. Due to the scarcity of weather stations on the network, the irrigator can then choose to use the calculated effective rainfall for the site or enter in more localized rainfall data to determine what the total water requirement is, in inches.

Frequent users of the TexasET website have the option to create online landscape profiles, following steps similar to those used in the turf and landscape calculator in order to receive emailed irrigation recommendations on user defined intervals. However, due to the limited number of stations on the network, recommendations are given in inches without rainfall automatically deducted. Although given the rainfall recorded at the ET weather station, this allows users to use the most localized rainfall data (weather service, backyard rain gauge, ect.) available to them to determine irrigation requirements.

Challenges of Using TexasET

Many homeowners understand the irrigation recommendations produced by the TexasET Network. However, the challenge to homeowners becomes implementing the irrigation recommendation, particularly due to many homeowners not knowing the precipitation rates of their irrigation stations. Since irrigation controllers are programmed for runtimes (minutes) and not irrigation requirements (inches), homeowners do not effectively know how to implement the schedule. Texas regulations have made it easier for homeowners with newer irrigation systems (installed after January 2009) since irrigation scheduling information is required to be given to the irrigation system owner following completion of the installation. Larger municipal water utilities offer auditing and irrigation evaluation services to customers in higher water use tiers but smaller residential customers might often have to hire an irrigation professional (such as the Licensed Irrigator in Texas) or Certified Landscape Irrigation Auditor, which can be expensive in some cases.

Water My Yard Program

One possible solution to help homeowners determine when and how long to run their irrigation systems while using science based methods is the Water My Yard Program (<http://WaterMyYard.org>). The Water My Yard program website employs simple, intuitive images and information prompts for homeowners to get recommendations on how long (in minutes) to run their irrigation system. The program was launched in May 2013 as a joint effort of the Irrigation Technology Program of the Texas A&M Agrilife Extension Service (Extension) and the North Texas Municipal Water District.

The North Texas Municipal Water District (NTMWD) covers 1,600 square miles and provides water services to 1.6 million residents of North Texas through 13 member cities. NTMWD provides the majority of water from surface water storage in Lake Lavon. With persistent drought over the last few years, lake levels have dropped resulting in mandatory water restrictions, particularly for landscape irrigation. Most restrictions have limited outdoor watering to two (2) days a week irrigation with recent restrictions allowing only one (1) day a week watering.


Working with Extension, NTMWD purchased and installed seven (7) ET Weather Stations. Locations were chosen based on elevation, microclimates, district property, and variations in typical rainfall patterns. Weather station data is collected daily as a part of the TexasET Network to calculate daily ETo. A custom interactive map was created (Figure 1.) for homeowners to select their location within the district while showing them which weather station is used for their area.

As discussed, precipitation rate is needed to produce an irrigation runtime. Once their location is selected, the homeowner is prompted to enter their precipitation rate (Figure 2.). If the precipitation rate is not known, they are given instructions on how to conduct a catch can test in their yard to calculate their precipitation rate or they can select their sprinkler type. Working with state and local irrigation associations and sprinkler manufacturer representatives, a list of irrigation systems was developed to describe turf grass irrigation systems in the area (Figure 3.). These include the major types of emission devices used such as spray heads, rotors, multi-stream rotors and drip irrigation (required in some landscapes as per Texas Rules and Regulations). After the sprinkler type is selected, the spacing between sprinklers (or emitters) and the manufacturer is selected in order to fine tune the precipitation rate for calculating runtime (Figure 4.). Once the precipitation rate is set, a runtime can be calculated.


In order to calculate the runtime, assumptions have to be made to make this simple for homeowners. The obvious first assumption is that the homeowner is watering a warm season turf grass, however residential turf does not need its maximum water requirement to maintain acceptable turf quality like a golf course green or a sports field. Typically we can reduce water requirements by 40% and still maintain acceptable turf quality. This is typically reflected as an adjustment factor of "Normal Quality" or 60% of turfgrass evapotranspiration (ETc). In the case of NTMWD, a shift from Stage 2 Water Restrictions (2 Days a Week Watering) to Stage 3 Water Restrictions (1 Day a Week

Watering) requires a 10% reduction in water use as a part of the districts drought management plan. During these periods the adjustment factor can be reduced to a “Low Quality” or 50% of turfgrass ETc. This will keep the turfgrass alive but may result in some mild visual signs of turf stress during peak ET in the summer. Taking the adjustment factors into account along with user defined precipitation rate and localized weather station rainfall, the Water My Yard Program can calculate weekly irrigation runtimes (Figure 5.). Once a runtime recommendation has been calculated for a site, the homeowner can then sign up for weekly irrigation runtime emails to be received every Monday.

About Contact



Water My Yard



Know your water.

A project of the North Texas Municipal Water District-Water IQ Program and the Irrigation Technology Program of Texas A&M Agrilife Extension Service.

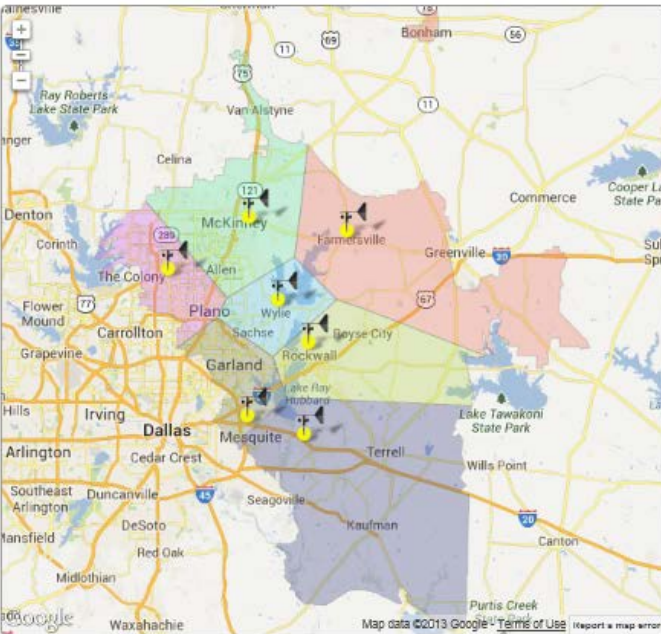
A HEALTHY LANDSCAPE ACTUALLY REQUIRES LESS WATER THAN YOU MAY THINK. The “Water My Yard” program has been established as a tool to assist you in determining an adequate amount of supplemental water that is needed to maintain healthy grass.

It only takes a few short steps to begin receiving a weekly email to know how much water your landscape actually requires based on local weather conditions - effective rainfall, solar radiation, relative humidity and wind.

What is ET?

Start here: Select your service area:

To begin, click on the map where your home is located. [Help?](#)



© 2013 Texas A&M Agrilife Extension

Figure 1. Water My Yard Homepage-Map

[What is ET?](#)

Service area: **Plano**

Set your precipitation rate:

If you know the precipitation rate of your irrigation system, enter it in the precipitation rate box below. If not, click [here](#) to select which type of irrigation system you use for your turfgrass. [Help?](#)

If you know your irrigation system's precipitation rate please enter it below.
(Press the enter key once you have entered a precipitation rate)

Precipitation Rate
(in/hr)

[How you can determine your irrigation system's precipitation rate.](#)

OR

[Click here to select your sprinkler type](#)




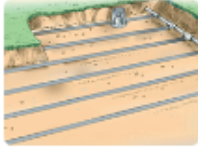
© 2013 Texas A&M AgriLife Extension

Figure 2. Water My Yard- Enter Precipitation Rate

Service area: **Plano**

Set your precipitation rate:

If you know the precipitation rate of your irrigation system, enter it in the precipitation rate box below. If not, click [here](#) to select which type of irrigation system you use for your turfgrass. [Help?](#)

Multi-stream		Applies water in multiple moving streams across the lawn, typically in either a circle, half circle, or quarter circle pattern.
Rotor		Applies a single stream of water that rotates in a circular pattern over the lawn.
Spray		Applies a solid continuous fan of water across the lawn, typically in either a circle, half circle, or quarter circle pattern.
Drip <i>(Sub-surface drip of turf only)</i>		Applies water through dripping emitters in a buried hose in the lawn's root zone. Sub-surface drip of turf only.

© 2013 Texas A&M AgriLife Extension

Figure 3. Water My Yard- Select a Sprinkler Type

Precipitation Rate Details ×

Please select from the options below

Irrigation spacing:

Manufacturer

Toro

Rainbird

Hunter

Weathermatic

I don't know

Figure 4. Water My Yard- Select a Sprinkler Details

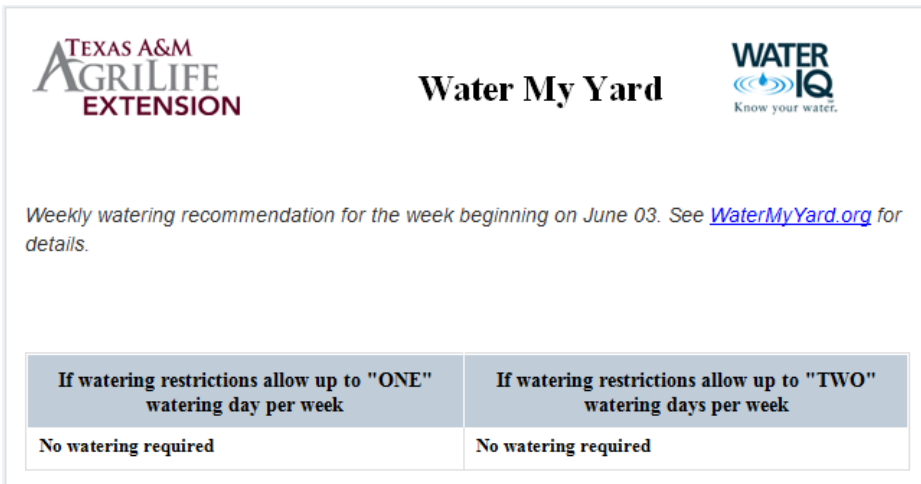


Figure 5. Water My Yard- Recommendation

Conclusion

The Water My Yard program as of October 1, 2013 has 603 user accounts within the North Texas Municipal Water District since coming online 4 months ago. Three additional water utilities and water districts have adopted the concept and will be joining the Water My Yard program during the Fall of 2013. Further research and analysis needs to be conducted to determine optimal density of ET weather stations and rain gauges based on spatial variability in urban environments. Refinements may also have to be made to the irrigation system options by expanding sprinkler criteria to better fine tune runtime recommendations and more outreach on educating homeowners how to calculate the true precipitation rate of their irrigation system.

References

North Texas Municipal Water District. <http://NTMWD.com>. June 2013.

Texas A&M Agrilife Extension Service. TexasET Network. <http://TexasET.tamu.edu> . June 2013.

Texas A&M Agrilife Extension Service. Water My Yard Program. <http://WaterMyYard.org>. June 2013.