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LANDSCAPE IRRIGATION EFFICIENCY

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A common question is, "How can I be efficient with my irrigation system?" Improving irrigation efficiency involves a combination of practices that help maintain a healthy landscape while reducing over-irrigation. For an irrigation system to achieve peak efficiency, it must be properly designed, maintained, and managed.

IRRIGATION SYSTEM DESIGN

An efficient irrigation system starts with proper design. The most important irrigation design principles are sprinkler head spacing and operating pressure. Manufacturers publish product specifications that provide the recommended operating pressure of sprinklers and spacing each sprinkler should be installed at. The amount of water applied to the landscape typically decreases the further it is thrown from each nozzle. Thus, sprinkler patterns should overlap creating head-to-head coverage. Sprinklers operating at the wrong pressure—or installed with incorrect sprinkler head spacing—will result in a poor water distribution uniformity over the landscape, often causing dry spots and unhealthy plants. When installing a new irrigation system, ask to see the manufacturer's specification for the sprinklers selected to confirm that the correct spacing is being used (Figs. 1 and 2).

Figure 1. Sprinklers installed at correct spacing providing head-to-head coverage.

12A
● Green

12' radius
Adjustable from
0° to 360°
Trajectory: 28°

Pressure PSI	Radius ft.	Flow GPM	Precip in/hr ■	Precip in/hr ▲
20	11	0.25	1.59	1.84
25	12	0.28	1.60	1.85
30	**12**	**0.32**	**1.68**	**1.95**
35	13	0.37	1.80	2.08
40	13	0.42	1.91	2.21

Figure 2. A Product Specification showing pressure and spacing.

Water utilities rely on high pressure to deliver water to their customers. Without pressure there would be no water when opening the faucet at home. However, most irrigation systems require less pressure than is provided to residences. Spray head sprinklers typically perform best when operated at 30 psi, while rotary sprinklers require between 40 to 50 psi. Operating sprinklers above the recommended pressure creates fine water droplets and a misting effect that allows water to easily evaporate or blow away (Fig. 3). If sprinklers operate below the recommended operating pressure, the water

Figure 3. An example of sprinkler heads operating at high pressure, resulting in misting.

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will not be thrown far enough from the sprinkler to provide complete "head-to-head" coverage. This often results in wet and dry spots, or green circular pattern areas around each sprinkler (Fig. 4).

If the irrigation system does not appear to be operating at the correct pressure, have a licensed irrigator inspect it. Irrigation systems can be inexpensively retrofitted with a pressure regulator to correct situations where there is too much pressure. For situations where there is insufficient pressure, a combination of approaches is used to correct the problem such as re-nozzleing the system or switching out sprinkler heads.

Figure 4. An example of poor sprinkler uniformity, as a result of operating at low pressure. *Photo courtesy of Irrigation Association*

Figure 5. Broken sprinkler.

Figure 6. Clogged nozzle.

Figure 7. Spraying on the street.

IRRIGATION SYSTEM MAINTENANCE

Over time, irrigation system hardware will begin to wear and break. Foot traffic and landscape maintenance equipment such as lawnmowers may cause damage to the system. Irrigation systems should be checked regularly for problems (at least once per season). The best time to check equipment is in the spring when first starting up the system. Watching each sprinkler zone operate for a few minutes can help identify common irrigation system problems such as:

- Broken sprinkler heads and pipes (Fig. 5).
- Clogged sprinkler nozzles (Fig. 6).
- Sprinklers not rotating.
- Sprinklers not popping straight up.
- Sprinklers throwing water on the driveway, sidewalk, or street (Fig. 7).
- Irrigation zone valves not turning on or off.

Often, problems like water being thrown onto driveways, walkways, or the street can be fixed by making a simple adjustment to the sprinkler head. Repairs that involve replacing components can be more challenging and may require the services of a licensed irrigation professional.

Hiring a licensed irrigator will ensure that repairs are made correctly and according to local and state regulations. When purchasing a new irrigation system, a licensed irrigation professional will also provide a maintenance checklist.

IRRIGATION WATER MANAGEMENT

A properly designed and well-maintained irrigation system will only be as efficient as the person managing it for when and how much irrigation is applied. The key to good water management is knowing how fast the irrigation system applies water and how much water the landscape area needs on a weekly basis.

Irrigation systems apply water at different speeds, called the "precipitation rate." Factors such as sprinkler type, nozzles size, pressure, and spacing determine the rate at which water is applied. The precipitation rate is measured in "inches per hour." Rates can vary from 0.5 to more than 1.5 inches per hour. Knowing the precipitation rate is necessary to determine how long to run the system. Manufacturers' performance charts provide an estimate of the precipitation rate (Fig. 2). However, it is usually more accurate to measure the precipitation rate by conducting a "catch can" test (See *Using the Aggie Catch Can* handout)(Fig. 8).

Figure 8. An example of conducting a catch can test to measure the precipitation rate.

To determine how long to run the irrigation system, the precipitation rate is used along with an estimate of how much water the landscape needs. Some people generalize plant water requirements with recommendations such as 1 inch of water per week. However, in reality the water requirements of plants change throughout the year. Plants require little or no irrigation during winter, but water needs increase in spring, and peak in summer—typically in July or August for most of Texas. Following the summer peak, water requirements slowly decrease in fall. Applying the same amount of water year-round results in excess use and wasted water, especially in the spring, fall, and winter.

Using evapotranspiration (ET) is the simplest way to track plant water needs. ET is calculated using local weather data consisting of temperature, relative humidity, wind, and solar radiation. In Texas, the best resource for ET is the Texas ET Network (*TexasET.tamu.edu*). The website has an online tool for calculation of plant water requirements and irrigation runtime (Fig. 9).

In many urban areas of Texas, the *WaterMyYard* program (*WaterMyYard.org*) is available. Users may create a profile and sign-up to receive weekly notifications by email, text message, or through the app, which will calculate how many minutes it takes to run a specific type of irrigation system. *WaterMyYard* also has easy-to-use tools to enable users to determine their precipitation rate. In addition to the website, iOS and Android apps are also available.

Whether setting the irrigation controller for a manual runtime or a programmed watering schedule, always check if the city or local water provider has any active landscape watering restrictions such as times during the day or days per week allowed.

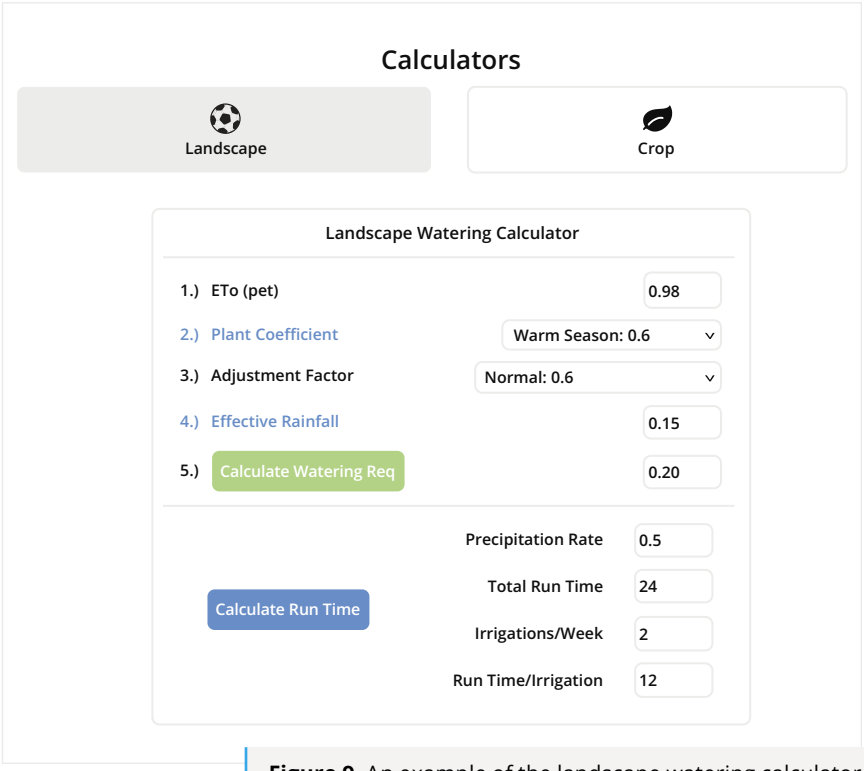

Figure 9. An example of the landscape watering calculator on the Texas ET Network website (*TexasET.tamu.edu*).