SOUTHWEST TREES & TURF

The Smart Controller is You - Part I

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Some water providers are encouraging consumers to install "smart" controllers. This line of reasoning suggests that if programming is taken out of the hands of residential users and provided with ET-based inputs to control irrigation timing and frequency, conservation will follow.

And it's true - if, and only if, the proper hardware and environmental information is provided a lot of water can be saved. Watering window duration, separation of dissimilar plantings, hydro-zone orientation and other factors must be considered when the system is designed. If that doesn't happen, programming for conservation is more difficult and truly efficient watering may not be realized, but management will still be greatly improved with "smart" technology.

Another problem is that when "smart" controllers are installed they are often not programmed with the proper inputs. What's hanging on the wall is a dumb controller with a cool logo and extra wiring connections. Basic preliminary setup is even more important with these controllers that with more traditional control systems. "Smart" controllers usually offer interactive menus that guide you through the programming process. Still, a certain degree of water management experience is required.

In fact if you don't have a "smart" controller on your site you can still accomplish a high degree of water conservation. You just have to be more persistent (assuming you are provided the time and financial resources).

Initiating a watering program should be done in much the same way for any type of control system. In every case the key is setup.

For each controller station the following information should be gathered: plant material type, irrigation application rate and micro- environment.

PLANT TYPE

Different plant types (species) have different watering needs and they must be watered separately. This is the first and most basic way of creating hydro-zones, and should have been laid out in the design process as controller stations.

A great variety of plant types occur in the landscape. They include cool season turfgrasses, warm season turfgrasses, lush ornamental grasses, xeric ornamental grasses, xeric shrubs, water-loving shrubs, trees etc.

However, at a single site the plant variety will be narrower, and will often include only two or three different hydro-zones. For example, a site may include some cool season turf, xeric shrubs and new ornamental trees. Depending on climatic zone these plants can be assigned a crop coefficient something like this: 0.8 x evapotranspiration rate (ET) for the turf, 0.5 x ET for the shrubs, 0.7 x ET for establishing trees.

Obtaining ET information is sometimes difficult. One way to begin is to do a web search. You can also contact your local extension agency. Placing a metric on landscape coefficients is a newer science than that established for agriculture, but numbers are being published by experts in various locations with greater frequency simply because water supply is threatened all across the country.

Your basic program should match peak season ET. In most US locations that would be during July. If the heat, wind, and sun of the average July day requires 0.20 inches of ET then cool season turf water needed would be 0.8 x 0.20, or 0.16 inches per day. Water demands for other planting types are computed in the same way.

The second thing to think about is that each type of plant will inhabit a different size of root zone. You want to provide water across the entire root zone and to the depth that the roots reach. Generally plants with deeper root zones can be watered less frequently because they possess a larger supply of soil water.

Root depth depends greatly on the soil, but we can state some general rules considering only plant species. Turfgrass will seldom root more that eight inches in depth while shrubs at maturity may reach 18 inches or more. A tree may, at some point in its life, reach downward two to three feet. To keep the plants healthy, watering must occur in such a way as to provide soil water throughout the root zone.

As mentioned before, the irrigation designer should have divided the landscape into hydro-zones based on the plant watering needs. If that was not done correctly, you will need to partially rebuild the system, or at least temporarily, create a program that relies on average needs within a zone. Keep in mind that the health of some plants may depend on over-watering or under-watering other plants.

APPLICATION RATES

Once you know how much water your plants need, you need to find out how much water in gallons per minute (GPM) you are actually delivering. Sprinkler manufacturers make it easy to sum the gallons flowing into a zone. You need only count sprinklers, check the pressure at the sprinkler and (often overlooked) check to see that the nozzles that are supposedly present are the ones that are actually in use.

Another way to gauge the GPM is to watch the water meter for a period of time (likely one minute) to discover the actual flow. Make sure no other flows are occurring at the same time.

Next, if you haven't already, measure the area of each hydro-zone. When you've done that you know the size of the zone (in square feet), the water needed for the plants in the zone (in inches of ET) and the amount being delivered each minute (in gallons). Next, we will put this information together. For example, let's suppose the zone's area is 1,000 square feet and you discover that you are applying 10 GPM to water it.

First, here's a formula that every irrigation manager must know: Application rate in inches per hour = (96.25 x GPM) / Area. The 96.25 is derived by converting volume in gallons to volume in cubic inches, then dividing by square inches.

In the above example 10 x 96.25 / 1000 = 0.96 inches per hour. This is the application rate (also called the gross precipitation rate).

The major complication is that you cannot assume that the water is being distributed evenly. You can make an educated guess by observing whether all sprinklers are operating without restrictions, as well as observing the spacing of the sprinklers and the evenness of that spacing.

If the sprinklers are small rotors such as PGJs or 3500s, spaced as recommended by the manufacturer, chances are this is an efficiently operating zone. We know this because 0.96 inches per hour is a logical and normal application rate for this type of sprinkler.

However if the zone is watered by spray sprinklers, the zone can't be watered very efficiently because 0.96 inches per hour is about half of the 1.8 inches that you would expect and require for this type of sprinkler.

The only way to calculate the uniformity of the zone is to do a "catch can" test in which a large number of containers are situated evenly throughout the zone with the zone operated for a time period. Each container's volume is measured and percent distribution uniformity is calculated. Several publications explain the steps involved. Probably the most efficient way of learning this technique is participating in a Certified Landscape Irrigation Auditor class as sponsored by the Irrigation Association.

Generally, new, well-designed systems provide distribution uniformities (DU) as high as 90 percent for some drip applications, 80 percent for large rotor sprinklers and 65 percent for spray sprinklers. Average existing systems often provide only 50 percent DU overall. Old systems patched together over a period of time in the cheap-water era may measure at 30 percent or less!

Divide the zone's application rate by the DU to find out approximately how many inches of water per hour you will actually need for the plantings. We will discuss this in depth in the next month's issue. You will also learn how to pull together all the information you have to provide a schedule that will insure both healthy plants and water conservation.

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