Evaluating Your Irrigation System

Excerpted from the presentation given by Richard H. White, Ph.D., Associate Professor Turfgrass Physiology, Texas A& M University at the 2000 STMA Annual Conference

Athletic field managers must consider the water conservation needs of their area while providing a safe and aesthetically pleasing facility for recreational use. Knowledge of the capabilities of the irrigation system combined with knowledge of the factors that affect turfgrass water use are essential for effective irrigation management.

To design an effective irrigation schedule it's essential to know: your irrigation system; your soil type, the rooting depth of your turfgrass; the water requirements of your turfgrass; and how environmental conditions affect the water-use rates of your turf.

Your Irrigation System

Do take the time to thoroughly understand your irrigation system, plotting the location and type of heads within each zone and learning all operational and programming aspects of your irrigation controller. You'll need to make frequent modifications to irrigation scheduling due to seasonal changes in turfgrass growth and variable environmental conditions. Knowing the application rate and distribution pattern of each head are key to establishing an effective and efficient irrigation schedule. To evaluate your current system, you can have an irrigation audit conducted for you or follow the steps listed below to conduct one yourself.

Your soil type

Your soil type influences how often you need to water as well as how much water you need to apply per application, since different soil types have different water holding capabilities. As soils dry, they hold onto their remaining water more tightly. Eventually, water is held so tightly by the soil, the turfgrass roots are unable to extract it for use. Thus, available water is the fraction of water that is held by the soil and can be extracted by plant roots. Under conditions of high evapotranspiration (ET), a percentage of the available water might not be available rapidly enough to prevent drought stress. Therefore, for the purposes of irrigation scheduling, it is important to focus on *Readily Available Water*, or the volume of soil water

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that will effectively prevent drought stress injury, regardless of environmental conditions. As a starting point, classify your soil type as sand, sandy loam, loam, silt loam, clay loam or clay, and check published soil texture charts for an approximate rating of readily available water expressed in inches per foot.

The rooting depth of your turf

Follow the procedures on step 6 of the irrigation audit to establish the average rooting depth of your turf. You'll want to irrigate to a depth just below the effective root zone. Irrigation water found below this depth is unavailable to the roots. Irrigating to a depth significantly less than the effective root zone can lead to a decrease in rooting depth. The deeper you irrigate within the effective root zone, the less frequently you'll need to irrigate.

The water requirements of your turfgrass

Water requirements of turf can vary significantly depending on species and varieties, the specific use of the turfgrasses and their level of management. Heavy traffic and high priority athletic fields require a higher level of management and an irrigation level matched to this level in order to maintain appropriate turfgrass quality.

The effects of environmental conditions

Humidity levels, temperatures and wind speeds all significantly affect water lost through evapotranspiration. Seasonal changes, specific daily or weekly weather patterns and the elements of individual microclimates must all be considered to balance irrigation scheduling to turfgrass needs.

Performing an Irrigation Audit

1. To obtain the most accurate results, perform the audit during the same time of day the system normally operates. Extremely windy or rainy conditions should be avoided.

2. Determine the square foot area of irrigated turf and record this value on the auditing report. Draw the area on graph paper to scale (as best you can).

3. Turn the irrigation system on and flag each sprinkler head by individual zones, with flag stakes. Plot each head on the graph and label with a letter.

4. Measure and record the distance between each head (head spacing).

5. Using a soil probe, pull multiple soil samples from across the irrigated area.

6. Examine the soil samples and determine the effective rooting depth. The plant's effective rooting depth is the depth of soil, in inches, that contains a large number of live, growing roots. Find an average rooting depth from all soil samples. This will provide a more realistic measurement. Record the average rooting depth in a report form.

7. Determine the soil type by feeling a soil sample. A clay soil will feel sticky and form a ribbon when squeezed between the fingers. A sandy soil will feel gritty and a loamy soil will be a mixture of sand, silt, and clay. Record this information for later use.

8. Start with zone I.

9. You will need sufficient catch cans to perform the irrigation audit. Straight-sided cans such as coffee cans, tuna and cat food cans work well, or rain gauges can be used.

10. Place the catch cans at each sprinkler head and halfway

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between heads. This simple placement pattern requires the least number of catch cans while providing adequate coverage of the tested area. When placing catch cans "at each head" make sure they are far enough away from the head as to not interfere with the spray pattern. Plot the location of each catch device on the graph and label it with a number.

11. Run the zone for a short period of time. The runtime should be long enough to allow for five to ten rotations of a geared rotor or impact sprinkler head. Normally, testing runtimes are in the range of 10-30 minutes for large sprinklers. While shorter testing runtimes permit faster auditing, the longer times give better accuracy. Spray head systems will normally not need to run more than 4 to 7 minutes to provide accurate measurements. Record the runtime.

12. While the system is running, it is a good idea to check and record the water pressure of each head.

13. After the zone has completed its designated runtime, measure, and record the depth of water caught in each catch device. A ruler can be used to accurately determine the depth.

14. Average all catch can depths for the zone. Record this value.

15. Transfer all individual catch depths and head pressures to their appropriate location to the graph.

16. Look for distribution problems within the system. Keep in mind, other heads, not on that particular zone might add to the depth of some catch cans, especially those cans near each head.

17. If problems exist, determine the cause(s). (Pressure, wind, head alignment, etc.)

18. Repeat steps 10 through 17 for the remaining zones.

Aside from irrigation audits, routine checks of your system should be performed to ensure each head is set up and working properly. Record any problems on a report form. Things to look for include: broken sprinkler heads; misaligned heads; sunken heads; high pressure; low pressure; leaks; and improper rotation.