SPORTS FIELD IRRIGATION AUDITS - PART 1

Don Savard, CSFM, CGM

Prior to the summer of 2006, I managed the irrigation on my sports fields simply by direct observation. I looked at the condition of the turf, and if it looked dry, I would set up a hose and sprinkler and let it run for a reasonable amount of time. Sometimes I would catch water in a can so that I could measure how much I was putting down. During periods of heat or drought, I would run around like a nut moving hoses and sprinklers to irrigate areas that appeared to be under stress. Many an evening, weekend and holiday was spent attempting to keep my turf green.

Since then, two things have changed. First, I read an article in Sports Turf Magazine by Dr. Dave Minner (Iowa State University) suggesting that my method of irrigation was not efficient. The article went on to say that deeper and denser root systems and better stress tolerance were a result of heavier, less frequent irrigation. Second, at the 2006 STMA Conference in Orlando, I attended an Irrigation Audit Workshop held at the Disney Wide World of Sports Complex. From the workshop, I learned that the irrigation audit was a turf management tool that would help me grow healthier turf, conserve water, and save money. From actually doing it, I learned that it would also save time, *my time*!

An irrigation audit will help you discover how frequently and how long to irrigate. It considers the needs of the turfgrass plant; for example, the depth of the root system helps to determine how much water the turf needs. It helps to determine how well your irrigation equipment or system works. Aside from looking for leaks and other inefficiencies it helps you find out much water is coming out of the sprinkler head in a minute and how uniformly it is distributed over the soil. It will also tell you how the soil and water interacts *on your site!* By performing an irrigation audit you will discover what your soil texture is, how much water the soil can hold and the rate that water moves downward or percolates through the soil profile. You will even learn how the rate of evaporation and transpiration changes during different months.

One Saturday, last May, 2006, the weatherman predicted a warm, sunny day with no wind, a perfect day for an audit! If I got wet, I would not freeze, also no wind meant more precise measurements. I wanted to determine once and for all how much water I was putting down and how frequently I needed to irrigate.

An irrigation audit requires only some time and some very low tech tools (tape measure, catch-can devices, metric graduated cylinder, stopwatch, calculator, notebook and pencil). The audit can be performed with both in-ground and portable above-ground systems. The audit is sequential, meaning that each step provides information necessary for the next step.

The test requires data collection from the field as well as information found on the internet, books and even from the irrigation systems manufacturer. In the field, you will need to **measure the test area** where you will operate the sprinkler. This could be the irrigation zone for an in-ground system or it could be the area that a portable sprinkler would cover. Next, you place catch-can devices in an equally spaced pattern where you will **collect the precipitation** from the sprinkler. The catch-can devices can be store bought or they can be like mine, simply a paper cup taped to stake to hold them upright. Just make sure that all of the catch cans are uniform. Run water through the irrigation system for a predetermined amount of time and **measure and record** the amount of water collected in each catch-can.

You will need to find out the volume of water coming out of your sprinklers in gallons per minute. This can be determined with a flow metering device, or manufacturer's technical data for the system. This information will help you find gross and net precipitation. **Gross precipitation** is the water that sprays out of the sprinkler nozzle.

$$\text{Gross Precipitation Rate in inches per hour} = \frac{\text{96.3 gallons per minute from sprinkler nozzle}}{\text{area being irrigated in square feet}}$$

(96.3 is mathematical constant used as a multiplier)

Net precipitation is the amount of water collected in the catch cans. Find the area of the catch-can opening by measuring the area of the circle that is the opening (Area = πr^2).

$$\text{Net Precipitation Rate} = \frac{\text{Average catch volume in millimeters x 3.66}}{\text{Test run time in minutes x (Catch device area sq. inches) (16.5)}}$$

(3.66 And 16.5 are mathematical constants used as multipliers)

Net precipitation is compared with the gross precipitation to observe water loss as well as to measure the **irrigation application efficiency**.

$$\text{Irrigation application efficiency} = \frac{\text{gross precipitation rate}}{\text{net precipitation rate}}$$

After measuring the amount of water in each catch can, I was able to determine **uniformity of distribution** of the sprinklers. This will show how well the sprinklers distributed the water evenly over the test area.

$$\text{Lower quarter distribution uniformity} = \frac{\text{average of the lower quarter of 25\% of the devices in millimeters}}{\text{average of all catch - can devices}} \times 100$$

Don Savard is a Certified Sports Field Manager (CSFM); Certified Grounds Manager (CGM); Director, Athletic Facilities and Grounds, Salesianum School; and member of the SFMANJ Board of Directors