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# Effective Water Use

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Just like all living plants, your turfgrass needs water for growth and survival. In most cases, rainfall does not provide the amount of water actively growing turf requires. Irrigation can supplement rainfall and provide the water necessary to sustain a high quality turf. Effectively managing your water use maximizes your turf's health and limits waste. Following are some tips to consider when managing irrigation on your field.

## Know Your Soil

Knowing the texture of your soil will help you determine how often to water.

- Sandy soils drain quickly, requiring more frequent watering than slower-draining clay soils.
- When watering soils high in clay, irrigation rates should be slow and over an extended period of time to allow the water to move into the soil without running off. If you have an automatic irrigation controller, scheduling soak times of 30 minutes between irrigation cycles reduces the risk of runoff.
- On high clay soils, schedule your watering at least one day prior to any game or practice to avoid muddy conditions.

## How Often to Water

Your field loses water through evaporation and plant transpiration, known together as evapotranspiration (ET). The higher the ET level, the more water is lost. By monitoring your turf along with environmental conditions, you can efficiently manage your water use.

- Watch for signs of moisture stress. The first sign of moisture stress is the turf turning a dull blue/purple color. One way to determine if the turf is under moisture stress is to see if your footprints spring back up after you walk across the field—if they don't, then it is time to water.
- Monitor soil moisture levels with a soil probe (Figure 1). The soil dries out from the top down so as you see the soil drying out 4 to 6 inches below the surface, you will know you need to water soon. Get in the habit of routinely checking your soil's moisture.
- Let the turf and soil tell you when to water – don't just set the controller to water every few days. Setting the controller to "Auto" and letting it go often leads to overwatering and inefficient water use and shallow, weak roots.
- Consider using moisture sensors. These buried sensors automatically monitor soil moisture levels and turn the irrigation system on when the soil dries out. Remember that these sensors are just tools that tell you about one spot on your field. You should still monitor moisture content with a soil probe at multiple locations on your field.
- Water loss from evaporation and transpiration (ET rate) is highest on clear days with low humidity and high winds. You will need to water more frequently under these conditions compared to cloudy, high humidity, low wind speed days.
- Don't be afraid to turn the water off. Underwatering is better than overwatering. Allow the turf to show some signs of drought stress before you irrigate. This stimulates the plants to produce more roots. If you are not seeing any drought stress, you are overwatering.

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## How Much Water to Apply

The amount of water you put down during an irrigation event is just as important as how often you water.

- Apply enough water to moisten the soil to a depth of 4-6 inches. Deep, infrequent watering is the best way to promote deep, healthy roots.
- Light watering (only wetting the top inch of soil) leads to shallow rooting because the roots do not need to grow deeper to find water. Light watering leads to a cycle of shallow, frequent watering, which only promotes additional shallow rooting, increased soil compaction, and the need for more frequent irrigation.
- A general rule on a loam soil is to apply ½ to 1 inch of water (depending on soil texture) no more than twice per week during periods of active growth. This schedule must be adapted as rainfall and environmental conditions warrant.
- Place rain gauges or cans on your field and run the water for a set amount of time to determine how much water you are applying in that time period. You can then fine-tune the run time of the system to give the amount of water you want. You can also check if your sprinklers are evenly distributing water across the field.

## What Time of the Day to Water

If you have an automatic irrigation system, you have the freedom to set your system to run any time of the day or night. Even if you don't have an automatic system, you can still pick times during the work day that lead to the most efficient water use.

- Irrigate in the early morning hours if possible. Watering between 4:00 and 9:00 AM is most efficient because both the evaporation rate and the wind speed are generally low. (Figure 2)
- Avoid watering in the evening. Wet leaves favor disease development during the overnight hours.
- Avoid watering during midday. Although it doesn't hurt the turf and may even have a cooling effect, evaporation rates are highest during this time and you may need up to 30% more water to supply the same amount to the soil as an early morning watering.

## Other Considerations

Athletic fields with a deep, healthy root system require less water than shallow rooted fields. As a result, tailor your maintenance practices to promote deep rooting.

- Avoid close mowing, excessive fertilization, soil compaction, and excessive thatch, as each of these leads to shallow rooting.
- Consider syringing to lengthen the time between irrigation events. Syringing is applying very small amounts of water to the turf canopy at the first signs of drought stress (around midday). This helps cool the plant without adding water to the soil. By syringing you can extend the time between deep waterings by a day or two.

## Using Effluent Water

Effluent water, also known as non-potable, recycled, or reclaimed water, is becoming a viable option on golf courses and athletic fields as potable (drinking) water conservation is necessary in many parts of the country. Here are some facts about effluent water:

- Effluent water is partially treated wastewater from sewage or industry.
- Effluent water is cleansed of major pollutants but can contain high levels of salts, sodium, bicarbonates and/or heavy metals.
- Remaining harmful pollutants are filtered out by the turf before reaching groundwater.
- Effluent water also contains nitrogen as well as other nutrients used by turf.
- The quality of effluent water varies from region to region.

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## Management of Fields Using Effluent Water

If you are using effluent water, you must be prepared to monitor water and soil conditions.

- Test water (4 times/year) and soil (2 times/year) regularly. Send samples to an independent lab that is familiar with saline and sodic soil conditions along with turfgrass requirements. Be sure the lab is testing EC (electroconductivity) and SAR (sodium absorption ratio). Information on irrigation water testing can be found at http://turfgrassmanagement.psu.edu/irrigation_water_quality_for_turfgrass_sites.cfm
- If your field is in an area with little rainfall and you rely heavily on effluent irrigation, you must pay extra attention to salt and sodium buildups. High levels of salts stunt turf growth and high levels of sodium destroy soil structure.
- You can monitor your EC levels with a portable EC meter that you can use in the field, but it should not be used in place of lab tests.
- Because of high salt and sodium levels, application of water above normal irrigation requirements (10-20% higher) is often needed to leach the salts and sodium below root depth.
- If the soil test shows high levels of sodium, gypsum along with heavy irrigation should be applied to help preserve soil structure.

## Determining Nutrient Levels in Effluent Water

Your water quality report will give you concentrations of nutrients found in your sample in the units of ppm (parts per million) or mg/L (milligrams per liter). You can convert those units into pounds per 1000 ft2 in 2 easy steps:

1) Multiply ppm or mg/L by 2.7 (giving you a number representing lbs. of nutrient per acre-foot)
2) Divide that value by 43 (giving you lbs. of nutrient per 1000 ft2)

**Example:** Your test report says the water has a nitrogen content of 10 ppm.

1) 10 ppm X 2.7 = 27 lbs. of nitrogen per acre-foot
2) 27 / 43 = 0.63 lbs. of nitrogen per 1000 ft2

This means that when you have applied 12 inches of irrigation, you have also applied 0.63 lbs. of nitrogen per 1000 ft2.

## Water Smart

You can improve the quality of your turf by watering correctly. If you understand the characteristics of your soil, constantly monitor soil moisture levels, and irrigate at the proper time of day, you will be watering effectively and responsibly. By following these guidelines, your turf will develop a deep, healthy root system that will help your field take on the stresses of gameplay.

Figure 1. Monitoring the moisture in your soil is great way to be sure you are not over or under watering your field.

Figure 2. Early morning is the best time to irrigate.