Conserving water on sports turf

THE PERCEPTION OF WATER CONSERVATION as strictly low water use does not work very well for sports fields. Sports fields are subject to high traffic where the performance is judged by safety, playability, aesthetics, and durability produced by the optimum application of cultural practices, including irrigation.

Choice of turf species and cultivars, irrigation system design, hardware, field construction, and management all have an integral role in sports turf water conservation.

The primary criteria for choosing grasses for sports fields are traffic tolerance and fast recovery from injury. Water conservation on sports fields is less about the turfgrass than about the management, while traffic tolerance is very much about the grass.

Grasses commonly selected for sports fields are bermudagrass, Kentucky bluegrass, perennial ryegrass, and tall fescue. Where adapted the bermudagrasses, especially the hybrids, have excellent traffic tolerance and recovery rate and are among the lowest water users. Kentucky bluegrasses, perennial ryegrasses, and tall fescues are the sports turf species of choice in cool climates generally requiring more water than bermudagrasses. The difference in water use and traffic tolerance between cultivars within a species measured under research conditions likely would not be noticed in day-to-day operation of a sports turf complex.

The turfgrass industry is active in developing new cultivars and the performance of the new cultivars is evaluated regionally at universities under the cover of the National Turfgrass Evaluation Program (NTEP). NTEP has reports of the performance of the cultivars available online (www.ntep.org).

The most critical means of sports turf water conservation is irrigation system distribution uniformity. Poor uniformity not only wastes water, but nullifies the benefit from the other cultural practices and lessens traffic tolerance. Patterns are caused by mal-functioning hardware, a poor design, low pressure, incorrect installation, and poor maintenance of the hardware. The system must function efficiently or water conservation is merely an exercise in futility.

How a field is constructed often is as much a determining factor in the effectiveness of the irrigation as is the design and construction of the irrigation system. Soil or sand rootzone, uniformity of the rootzone, subsurface drainage, and surface grade determine the percolation rate, water holding capacity, and potential for runoff.

Irrigation management tools available to the manager include moisture sensors tied into the controllers and evapotranspiration (ET) weather stations for water replacement calculations.

The scheduling of irrigation is the most misunderstood and difficult factor in irrigating sports fields, even with the technological tools. The irrigation needs of the field must be worked around sports activities, entertainment events, weather, and politics.

Soil compaction inherent to sport turf facilities reduces water infiltration decreasing traffic tolerance and causing runoff. Compaction is reduced by core cultivation. Thatch control by vertical mowing is also a cultural practice that improves infiltration and reduces runoff.

There is no real savings in keeping the soil moisture level below optimum for turfgrass growth on a sports field particularly when safety to athletes may be compromised. The art of irrigation calls upon the combination of science, experience, and management for sports turf performance. ■

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Water drop image courtesy of istockphoto.com

The most critical means of sports turf water conservation is irrigation system distribution uniformity

Include water costs when considering synthetic

By **Wm. Richard Yates, ASLA, RLA**

As the number of synthetic field installations increase each year, the need to address public health, safety and welfare issues related to synthetic turf surfaces becomes more acute. Current research is beginning to delve into the synthetic turf surface temperature mitigation and control of microbial populations.

The Pennsylvania State University Center for Sports Surface Research headed by Andrew S. McNitt, Ph.D., began extensive research and testing of synthetic turf systems and surfaces in the mid-nineties, and has been able to publish findings related to temperature mitigation of synthetic turf surfaces and recommendations for the control of microbial populations found in synthetic turf infill. Based on these studies, there is now a basis to understand the relationship between irrigation water usage and temperature reduction on a synthetic turf infill system and the elimination of microbial populations in synthetic turf infill systems.

It is well know that surface temperatures of synthetic turf are significantly higher than that of natural turf playing fields. These higher temperatures create a higher degree of physiological stress to athletes due to the heat transfer from the playing surface to the athlete's foot, resulting in a higher blood flow to dissipate the increased heat which can result in serious heat related health problems.

Surface temperatures in synthetic infill systems have been documented to be as high as 199.4° F when the ambient temperature is 98° F. Typically, a synthetic turf surface will be 86° F higher than the ambient temperature; however it is also important to note that each region of the country varies.

In the Penn State study, Dr. McNitt found that in order to reduce the temperature of a synthetic surface with irrigation water the surface required approximately .036 gals/sf. to reduce the surface temperature 14° F for a period of 2 hours. A synthetic turf soccer field with dimensions of 365' x 225' or 82,125 square feet would have an irrigation demand for one application of 2,956 gals. In comparison, a natural turf soccer field of the same size would typically require between 6,500-7,900 gals per day to maintain a quality turfgrass field.

If we were to compare the daily requirement for a synthetic field to that of a natural turf surface and project a 4-game event on a day where the ambient temperature is 86°F and the synthetic turf surface temperature is 170°F, a reduction of 14° to 158°F would most likely require irrigation of the synthetic surface before and after each of the 4 games bringing the daily irrigation demand to 11,824 gals per day per field where a once daily application of water to a natural turf surface is sufficient to maintain play growth without the need to mitigate surface temperature.

Although the amount of irrigation water required to maintain a synthetic playing surface provides some reduction in surface temperature, there is still a public health safety and welfare issue present due to the elevated temperature and greater physiological stress to athletes. Additionally, the perception that synthetic infill turf systems require less water and less maintenance than that of a natural turf field needs to be re-evaluated. Aside from the mitigation of surface temperatures on a synthetic turf surface, the need to clean debris and flush contaminants from the surface and infill add to the need for irrigation of synthetic fields. The true maintenance cost and irrigation demand for synthetic playing surfaces should be included in the final evaluation. ■

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Efficient irrigation: a practical, real world approach

By **Warren S. Gorowitz**

There are numerous products that can help transform a water-guzzling irrigation system into an efficient, water-saving model. From smart controllers and low-volume irrigation to soil moisture sensors and rainwater harvesting systems, these products, when incorporated into a properly designed system and integrated with best management practices, can offer real results.

Many turf managers aren't sure where to start, don't have money in the budget (despite the great longer term potential to recoup of the initial investment), or don't realize there are many simple things that can have a big impact on elevating your overall irrigation system efficiency.

Audits uncover system inefficiencies

A water audit should be the first step in any irrigation system evaluation. The audit process will reveal any inefficiency contained in the irrigation system, provide an accurate assessment of the system's distribution uniformity, and identify opportunities for improvement.

A Certified Landscape Irrigation Auditor will visit your site, conduct a complete site inspection and perform a system audit, which involves focusing on designated sprinkler zones using a grid pattern system of catchment devices to determine the existing system's distribution uniformity, or how evenly the water is being applied. The information collected will be used to identify opportunities and make recommendations for system enhancements, repairs or upgrades with water-saving technologies. The auditor should review the report with you in detail and answer any remaining questions.

Once you have your audit results and recommendations, you can create a custom plan for your site. Some things may require longer-term planning or budgeting, but there are some relatively easy and cost effective solutions you can consider as you get started.

Consider fertigation

Fertigation allows you to fertilize and irrigate a section of turf into one easy step. Traditional fertilizer programs require the use of "extra" water during the application process to ensure that the fertilizer penetrates the soil layer. During the process of fertigation, liquid fertilizer is directly injected into the irrigation system, making it easier for nutrients to infiltrate plant root zones and eliminating the need for watering above and beyond the irrigation system's scheduled program run time.

Fertigation can be even more beneficial when it comes to high-traffic areas or worn sports fields, as the typical response to reinvigorating these areas is to apply more water. If over applied, water can actually wash away valuable nutrients. Integrating a fertilizer injection system into your irrigation system can be a cost effective solution that contributes to your overall water savings.

Cultural practices can aid conservation

Turf managers can aid their quest for conservation by engaging in cultural practices that serve to complement water efficient irrigation systems.

• The use of coated, slow-release fertilizers, which have lower salt indexes than other quickly available nitrogen fertilizers, means less watering in, when compared to their non-coated counterpart products.

• Implementing a regular aerification schedule and base layer of organic matter or calcined clay products will help increase the porosity of the soil, aid in water and nutrient retention and allow deeper infiltration into the soil profile. This will promote deeper root growth and help plants resist disease and better withstand drought conditions

• Submit a soil sample to a testing laboratory for an inexpensive report explaining its balance of nutrients, which will help you select the appropriate fertilizer and application rate.

• In addition to saving water, implementing these practices will also improve your soil conditions and lead to healthier turf. ■

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