WATER MANAGEMENT FOR SPORTS FIELDS

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As potable water becomes more limited in many parts of the country from drought and population growth, developing sound water management programs on sports fields will become more critical. Sports turf managers must be informed about water conservation practices while providing a safe and aesthetically pleasing facility for recreational use. Knowing the factors that affect turfgrass water use and the capabilities of an irrigation system are essential for effective water management.

Turfgrass water requirements

Water requirements for turfgrasses can vary significantly depending on species and variety, specific use of the grass, and the level of management.

Grass Species

Species and even varieties within each species can vary significantly in their water use rates. Table 1 gives a general ranking of the water use rate for the more common turfgrass species.

Table 1. Rankings of Turfgrass Water Use Rates by Species

Ranking	Turfgrass Species
HIGH	Perennial Ryegrass Annual Ryegrass Poa Trivialis Kentucky Bluegrass
MEDIUM	Tall Fescue
LOW	Hybrid Bermudagrass Common Bermudagrass Seashore Paspalum Zoysia Japonica

Specific Use for The Grass

The specific use of the grass determines the level of management. The level of management directly influences the water use rates and the irrigation requirements. A sports field that receives heavy traffic or is a high priority field will require a high level of management. The type and intensity of traffic will also affect the level of management. Football and soccer cause more general turf stress and injury than baseball, and thus would require a higher level of management. However, baseball can produce more significant injury in the high use areas such as in front of the pitcher's mound.

Level of Management

Fertilization, mowing, and management of soil compaction and thatch, are all practices that influence turfgrass water needs.

Proper fertilization helps promote optimum shoot and root development. The deeper a grass' roots, the more capable it is of getting water held deep in the soil.

High nitrogen rates promote water use by promoting shoot growth at the expense of root development. This results in turf with short, weak root systems. Adequate potassium is very important to turf stress tolerance, particularly drought stress and traffic stress. A good soil fertility program should be based on soil test analysis. Table 2 provides common nitrogen rates for common sports turf grasses.

Table 2. Yearly nitrogen fertilizer requirement for common sports turf grasses.

Grass Species	Maintenance Needs Pounds of N per 1000 sq. ft. per year
Tall fescue	3-6
Common Bermudagrass	3-6
Hybrid Bermudagrass	4-8
Zoysia Japonica	3-6
Kentucky Bluegrass	3-6
Perennial Ryegrass	3-6
Annual Ryegrass	2-5
Poa Trivialis	2-5

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Mowing also effects root and shoot development. Turf that is maintained at a higher mowing height normally has a deeper, more extensive root system. However, as the leaf area increases, transpiration may increase resulting in higher water use rates. Therefore, moderate-mowing heights should be utilized during high stress periods.

Mowing frequency should be determined using the "1/3" rule. No more than 1/3 of the leaf area should be removed at any one time. Frequent mowing leads to thicker, denser turf. The higher the density, the lower the evaporative water loss from the soil. Also, dense turfgrass is more competitive against weed invasion. Table 3 gives recommended mowing heights for common sports turf grasses.

Table 3. Recommended Mowing Heights for Sports Fields.

Grass Species	Mowing Height (inches)
Hybrid Bermudagrass	0.5-1.5
Common Bermudagrass	1.0-2.0
Zoysia Japonica	1.0-2.0
Tall Fescue	1.5-2.5
Kentucky Bluegrass	1.0-2.5
Perennial Ryegrass	0.5-2.5
Annual Ryegrass	1.0-2.0
Poa Trivialis	0.5-2.0

Soil compaction limits both water and air movement into the soil profile, and thus reduces shoot and root development. A good aerification program should be established to break up compacted layers, significantly increasing air exchange and water infiltration rates. The frequency of aerification for specific turf areas is dictated by the intensity of traffic the area receives, the soil type, and soil moisture levels during use. Areas that receive heavy traffic, have high silt and clay contents, or have wet soils when being used require frequent aerification.

Thatch, the layer of dead plant material found between the soil surface and the base of the leaves, can slow water movement into the soil and lead to runoff. Thatch accumulation results from heavy fertilization, improper mowing and irrigation. Topdressing, vertical mowing and aerification can be utilized during low stress periods to help control thatch development.

Soil type

Knowing and understanding the characteristics of soils is crucial to setting up an effective irrigation schedule. Soil type influences how often, how much, and how fast water can be applied. Soil types have different water holding capabilities.

Available water is the fraction of water that is held by the soil and can be extracted by plant roots. As a soil dries, water is held more tightly within the soil pores. Eventually, water is bound so tightly by the soil that turfgrass roots are unable to obtain the water. The remaining water is unavailable to the grass. Under conditions of high evapotranspiration (ET), the available water might not be available fast enough to prevent drought stress.

Table 4, gives the general amount of readily available water held for each soil type (given in inches of water per foot of soil).

Table 4. Estimates of Readily Available Water for Different Soils.

Soil Texture	Readily Available Water (in/ft)
Sand	1.0
Sandy Loam	1.8
Loam	2.0
Silt Loam	1.75
Clay Loam	0.9
Clay	0.6

Turf rooting depth

To establish an efficient irrigation schedule, the turfgrass rooting depth must be known. Ideally water is generally applied to wet the soil just below the effective root zone. Water below the rootzone is unavailable to the roots, and therefore wasted. Applying water to a depth significantly less than the effective root zone can lead to shallow rooting. Shallow irrigation will also require more frequent irrigation to prevent drought stress. The more the surface is moist during field use the faster soil compaction will become a problem. Generally allowing 48 hours between irrigation and field use reduces the potential for soil compaction. The deeper water can be applied within the effective root zone, the less frequent irrigation will be needed.

Environmental conditions affect the water-use rates of turf.

Environmental conditions influence irrigation requirements. Low humidity, high temperatures, and high wind speeds significantly increase water lost from the soil and the plant by evapotranspiration (ET). ET rates are much lower when conditions are cool, humid, and/or calm.

The time of year also impacts irrigation frequency. During the summer months, when temperatures are high, and days are long, irrigation needs are high. During late fall, winter, and early spring, temperatures are cool, days are short, and water needs are generally low.

Proper management of water resources requires an understanding of turfgrass water needs by species; the interactions of fertilization, mowing, soil compaction, and thatch on turfgrass water use; soil types; turfgrass rooting depth; and the effects of environmental factors. By managing resources efficiently, it is possible to provide high quality, safe playing surfaces while practicing water conservation.