Use of Soil Moisture Sensor's To Conserve Water

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The importance of proper irrigation on the playability of high performance golf turf cannot be overstated. Besides being a basic requirement for plant growth, water management plays a critical role in turfgrass health, ranging from its interaction with compaction and root decline to its effects on fungal disease pressure and efficacy of fertilizer, pesticide, and other chemical applications.

In 2003, research will continue to evaluate the use of data captured from ECH2O soil moisture sensors to conserve water and define best management practices for turf irrigation. This research will utilize the most recent version of the Penman-Monteith model for evapotranspiration estimation, commonly referred to as FAO 56, to compare water use and efficiency of different irrigation regimes and their impact on turf quality on our sand-based bentgrass/poa research green. FAO 56 crop coefficients for turf, currently unavailable for this area, will be developed. Evapotranspiration estimates produced using climate data from the University of Minnesota weather station and software from The Toro Company will be used to guide irrigation inputs on test plots.

An irrigation program based on volumetric water content data obtained using Decagon's ECH2O soil moisture sensors will also be developed and tested. In contrast to the empirically derived FAO 56 irrigation model, which attempts to replace estimated water losses, the soil moisture based irrigation program should be grounded on the actual water needs of the turf as indicated by the sensors: projected estimates vs. real-time, tangible data. In a series of 2-3 week interval trials, these two irrigation regimes will be compared to the traditional "eyeball and footprint" irrigation program employed, in most cases very effectively, by many experienced superintendents. Lysimeters will also be used to measure sub-surface losses and actual evapotranspiration and to compare the volume of water "lost" to internal drainage between different irrigation regimes. Water use differences with respect to species (Kentucky blue and perennial rye), height of cut (green vs. fairway), and soil (sand vs. native loam), will also be studied.

The goal of this research is to not only promote water conservation in turf systems, but more importantly to better understand turfgrass water use trends and identify irrigation practices which result in optimum plant-soil-water relations. Using technologically advanced tools such as these sensors will benefit the turfgrass industry immensely in the future.

As a former "water rat", I find this project and its implications very exciting and hope the information obtained will benefit area turf managers through a better understanding of turfgrass water use and irrigation. I would like to thank the members of the MGCSA for their past and present support of turf research at the University of Minnesota.

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(Editor's Note: Jon Sass is a graduate student and Dr. Brian Horgan is an Assistant Professor in the Horticultural Science Department at the University of Minnesota. Dr. Van Cline is an Agronomist with the Toro Company.