Tour Stop #6: Implications of Irrigation Programming on Turfgrass Water Use and Performance

Mark Miller. and Kurt Steinke, Ph.D.
Department of Crop and Soil Sciences
Michigan State University

INTRODUCTION

As water usage becomes increasingly scrutinized across all regions of the country, restrictions limiting both the time and frequency of water applications will require a fundamental change in turfgrass design and management. Turfgrass managers will need to adopt lower-input, increased efficiency irrigation management regimes that limit luxury plant water consumption patterns yet maintain acceptable plant health. As many turfgrass cultural practices are completed under the assumption of continuous water access, few data are available to quantify plant and soil responses when water functions as a limiting resource. The objectives of this project are: 1) quantify seasonal soil water depletion patterns (i.e., wetting and drying fronts) and the performance of creeping bentgrass (i.e., A-4) and Poa annua maintained under three irrigation scheduling strategies, and 2) assess the effects of three irrigation scheduling strategies on annual leachate volumes; annual total NO3, soluble P, and total P nutrient loadings.

MATERIAL AND METHODS

The following irrigation treatments are being investigated in this study:

Treatment 1: Daily replacement of 80% evapotranspiration

If a 0.5 inch or larger rainfall event occurs, irrigation is withheld for two days. In Michigan ET rarely exceeds 0.3 inch/day. If 0.3 inch ET did occur, the 80% replacement would be 0.24 in, which over two days would be covered by the 0.5 inch rain event.

Treatment 2: Rooting depth adjusted irrigation

This treatment utilizes rooting depth measurements to determine how much water is available to the plant. Root length samples are removed to determine the depth of irrigation (i.e., if roots were 5 inches long, then 5 inches of soil with 20% plant available water would contain 1 inch of water). Irrigation is applied when the soil loses half of its plant available water and the amount of water applied replenishes the soil water to field capacity. The amount of water lost from the soil is calculated from daily evapotranspiration.

Treatment 3: Seasonally-adjusted target value for soil moisture based on current environmental conditions.

This treatment utilizes a time-domain reflectometry (TDR) probe to determine the volumetric water content of the soil. Once the volumetric water content decreases to 10% irrigation is applied to return the soil moisture to the 20% level.

Support for the project is provided by Project GREEN, the Michigan Turfgrass Foundation, the Michigan Turfgrass Environmental Stewardship Program, and the Department of Crop and Soil Science.