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Soil and Water Science Department Seminar

Speaker: **Neil Young**
Ph.D. Degree Candidate

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Title: **Drought Avoidance Adaptation of Warm Season Turfgrass in Response to Mild-Reoccuring Soil Water Deficit and N Fertilization**

Date: Monday, April 6, 2015

Time: 3:15 pm

Location: McCarty Hall A Room G186

An estimated 1720 Ml of water are used annually for golf course irrigation in Florida and public scrutiny necessitates more efficient water use. In agriculture, partial rootzone drying is an irrigation technique employed to improve water-use efficiency and root proliferation. Soil surface drying (SSD) is analogous in turfgrass systems and greenhouse experiments have demonstrated positive results. A repeated 12-mo split split-plot design field experiment compared four turfgrass, 'Celebration' common bermudagrass [*Cynodon dactylon* (L.) Pers.], 'Tifway', and 'TifSport' hybrid bermudagrass (*C. dactylon* x C. *transvaalensis* Burtt Davy), and 'SeaDwarf' Seashore paspalum (*Paspalum vaginatum* Swartz) subjected to daily evapotranspiration replacement irrigation or reoccurring SSD, with irrigation withheld until -15 KPa soil water potential trigger attained. Nitrogen (N) fertilization rate was the sub sub-plot factor and either 0.0, 3.3, 4.9, 6.5 for bermudagrass cultivars or 0.0, 0.8, 1.6, 2.5 g N m^{-2} mo^{-1} for paspalum was applied. Turfgrass quality was largely unaffected by SSD. Approximately 2 fold lower N fertilization was required for 'Celebration' to achieve similar quality as 'TifSport' or 'Tifway'. 'Celebration' responded to SSD with higher biomass accumulation, which improved N uptake (NUP). Lower evapotranspiration rate (ETR) and growth under SSD reduced 'Tifway' NUP. Moreover decreased ETR without carbon exchange rate (CER) reductions indicated more efficient water use for 'Tifway' subjected to SSD. Across bermudagrass cultivars, N fertilization >4.9 g N m^{-2} mo^{-1} increased ETR but not CER. Nitrogen fertilization and not SSD influenced canopy resistance components most with shoot density ranking from highest to lowest, 'SeaDwarf' > 'Tifway' > 'TifSport' > 'Celebration' with calculated rates of 1.6, 4.7, 5.3, and 3.7 g N m^{-2} mo^{-1}, respectively, required to generate maximum density. Interactive effects of SSD x high N fertilization enhanced root length density (RLD) across varieties and for 'Tifway' two fold higher RLD, deeper in the rootzone during the dry season indicated elevated drought avoidance. Reoccurring SSD shows potential as a technique to improve bermudagrass water use and extend intervals between irrigation. Because promotion of drought avoidance traits were mediated by N fertilization, restrictive legislation designed to reduce environmental impacts of turfgrass should consider complex agronomic interactions if the goal is more sustainable systems.

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