Improving Shade Tolerance in Turfgrass

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Improving shade tolerance is a top priority for turfgrass management on the golf course, in sport arenas, and in the landscape. Due to reduced photosynthesis under shaded conditions, carbohydrates essential for growth and health of turfgrasses can become limiting. Work initiated at MSU suggests fructose applications may reduce the negative impact of shade on turfgrass quality by supplementing sugars produced naturally during the photosynthetic process. Current work examines the impact of applying supplemental foliar fructose and the plant growth regulator Primo® (trinexapac-ethyl) to improve turfgrass tolerance/appearance to shade and simulated wear (Cady Traffic Simulator - CTS) for National Football League (NFL) fall schedule. Two cool season (Supina and Kentucky Bluegrasses) and two warm season (Bermudagrass and Zoysiagrass) turgrasses were established on GreenTech ITM modules at the Hancock Turfgrass Research Center, during summer 2003. After establishment, modules were moved from full sun conditions to an enclosed, shaded, simulated athletic research facility (The Dome) and grown from August 26 through December 15, 2002. Environmental conditions (light, temperature, and RH) were monitored for the duration of the experiment. Turf was maintained to athletic field standards including mowing, fertility, and irrigation. Foliar treatment combinations included 0, 1X/week, and 2X/week foliar applications of 1.25% fructose (+/-) dissolved in water with organosilicone adjuvant (Break Thru®, 0.1% w/v). Additionally, applications of Primo® at a rate of 0 or 0.3oz/module were made on August 26, October 7, and November 18, 2002. All treatments were compared to controls, which consisted of turfgrass plots that did not receive any fructose or Primo® applications. Traffic was applied with the CTS on a bi-weekly basis to simulate a NFL 8 game schedule. Turfgrasses were evaluated based on turf quality (turf density, shear tolerance, and surface hardness) and physiological status (chlorophyll content, carbohydrate metabolism, and overall plant stress measured by leaf reflectance).

Preliminary results suggest that all species/cultivars, except Bermudagrass, responded most favorably to weekly application of fructose and Primo®. Leaf reflectance data verified that no water stress occurred during the experiment to contribute to loss in turf quality. Also leaf reflectance appears to be a good indicator of loss of photosynthetic efficiency and vigor in turfgrass grown under extended shade conditions. Chlorophyll and carbohydrate profiles are currently being processed and will be analyzed for their relationship to turf performance.