FINE FESCUES AND SHADE TOLERANCE

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Shaded environments present a major obstacle for establishing high quality, persistent and hard wearing turfs (Wilson, 1997). Increasing the quality and health of turfgrasses under shade conditions has been an ongoing challenge. Exogenous fructose applications are being investigated as a potential method to counteract the effects of shade on turfgrasses. Fructans have been identified as common and important sugars in grasses, and are the primary carbohydrate reserve in cool-season turfgrasses (Sorochan, 2002). The objective of this study was to examine the effect of different light levels in combination with exogenous fructose applications on two different fine leaf fescue cultivars: chewings fescue *(Festuca rubra v. commutata)* 'SR5100' and creeping red fescue (*Festuca rubra v. rubra*) 'Dawson'.

The experiment was conducted at the Hancock Turfgrass Research Center (HTRC) at Michigan State University in East Lansing, Michigan inside a simulated dome environment. The fine fescue grasses were seeded on modules 23 July 2004 and moved into the dome 21 October 2004. The experiment was a randomized complete block design with two factors: light and fructose or no fructose as the control. The light factor had three different treatments: ambient light (AL, 5-20% PAR), 73 µmol m^{-2} s^{-1} light (HL) with 16h photoperiod using high pressure sodium (HPS) lights, and 32 µmol m^{-2} s^{-1} (LL) light with 16h photoperiod using HPS lights. Fructose (Isoclear®) was dissolved in water with an organosilicone adjuvant (BreakThru® 0.1% volume/volume) applied at a rate of 1.25% weight/volume once per week. In an additional study on the two fine fescues, Kentucky bluegrass (*Poa pratensis*) 'Cynthia', and Bermudagrass (*Cyondon dactylon*) 'Princess' light response curves (LRC) were taken inside an Econoair® growth chamber using a LICOR-6400® portable photosynthesis system which measured photosynthesis rates at increasing light levels.

Preliminary results of the first study showed that in each light treatment there was no significant difference between fructose applications and the control for turf quality and color. However, there was a significant impact on clipping weights and density due to fructose applications as compared to the controls for each lighting treatment. Preliminary results of the LRC indicated that the different turf species varied in their threshold levels known as the light compensation point (LCP) and light saturation point (LSP) and the LRC also indicated the required and potential carbon needs respectively by species.

In future studies the rate of fructose or number of applications may be increased to determine effects on improving turf performance under shade conditions. Also, fructose will be applied to the plants and LRC will be measured to determine if the application of fructose influences photosynthesis rates.

Citations

1. Sorochan, John C. and J.N. Rogers III. 2002. Sugars in Shade: The Effects of Exogenous Fructose Applications to Turfgrass under Reduced Light Conditions. Ph.D. Dissertation Michigan State University, East Lansing.
2. Wilson, J.R. 1997. Adaptive responses of grasses to shade: relevance to turfgrass for low light environments. *Int. Turfgrass Soc. Res. J*. 8:575-591.