ENHANCING TURFGRASS GROWTH UNDER REDUCED IRRADIANCE

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Turves subjected to shady conditions have reduced rates of photosynthesis. This lack of photosynthesis results in lower carbohydrate production, which is a major component for turfgrass growth and development. Fructans, which are synthesized from sucrose as a result of carbohydrate production, have been identified as the most common and most important sugars in grasses. Turfgrass managers in any discipline (landscape, golf course, or athletic fields) often have to deal with shady turf conditions; therefore, investigations to counter this dilemma are warranted. Supplementing low carbohydrate reserves by external sugar applications is a potential method to compensate for the effects of low light conditions.

If turfgrass is growing under sub-optimal light conditions, an increase in growth can potentially be effected by exogenous sources of sugar. By spraying tomato plants grown under a variety of conditions, with 10% sucrose solution, it was shown that sugar will effect a greater increase in dry weight if the tomato is growing in conditions where carbohydrate synthesis is limited. However, attempts to have sucrose taken up by turfgrasses have been unsuccessful. This is likely a result of the molecule size of the sucrose being too large for plant cell absorption. Experiments testing the use of fructose for turfgrass uptake have been very successful. Fructose applications at 1.25% by solution have been shown to greatly increase the efficacy for herbicide control when used in conjunction with an adjuvant. ***Our objective*** is to determine the uptake of different concentrations of fructose (1.25%, 2.5%, 5%, 7.5%, and 10%) in solution with two adjuvants (Breakthrough and Apsa 80) at two different concentrations (0.1% and 0.25%) to compensate for low levels of carbohydrates as affected by low light. Daily applications versus weekly applications were investigated to determine if toxicity effects occur or if periodical applications are adequate.

In addition, research to investigate the effects of particular fructose applications (based on above experiment) on different turf species will be determined. In addition, the uptake and translocation of exogenous fructose applications is being determined using 13C labeled fructose. Initial results have determined that less than 24 hours after foliar fructose applications to the leaves, the absorbed fructose is being translocated within the plant to the crown and roots (Figure 1). Total plant carbon partitioning is being determined where, differences in rates of Pn and carbon partitioning for turves under shade versus full sun conditions are being determined by 13C carbon dioxide pulsing. The uptake and translocation of exogenous fructose applications is being determined using 13C labeled fructose.

Figure 1. Foliar 13C fructose applications and translocation