

## Michigan Turfgrass Foundation Proposals for 2006

**Title: Cold Tolerance and Carbohydrate Metabolism in Turfgrasses Adapted to Michigan Winter Temperatures**

**Principal Investigator: N. Suzanne Lang**

**Technical Support: Andrea McMillan**

**Justification:** Improving turfgrass cold tolerance has been identified as one of the most important abiotic stress research priorities by MTF. Understanding the underlying metabolism associated with improved cold tolerance is a fundamental step to identifying how cold tolerance can be acquired under turfgrass management schemes. Cold tolerance to Michigan winter temperatures, which are normally well below the lethal temperatures of warm-season turfgrass species and some cool-season turfgrasses under different management systems can provide important answers to how cold tolerance can be enhanced. Research on grass species has indicated that the form of storage carbohydrate can have an impact on cold-tolerance. Specifically, cool-season turfgrasses are known to store carbohydrate reserves as fructans (polymers of fructose), which are believed to impart some cold-hardiness to these grass species. In contrast, warm-season turfgrasses store carbohydrate reserves as starch (polymers of glucose), which does not enhance cold-tolerance. Thus, understanding the carbohydrate profile of the most important turfgrass species in relation to lethal cold temperatures may give an indication of the ways these species adapted to winter temperatures within Michigan.

### **Objectives:**

- 1) Quantify the  $LT_{50}$  (lethal temperature of 50% of samples exposed) and absolute lethal temperature for cold tolerant and intolerant (subject to death during the winter) in Michigan.
- 2) Establish carbohydrate profile for cold tolerant turfgrasses during active growth, dormancy and as active growth is resumed, as compared to cold intolerant standard cultivars.

### **Methods:**

Re-growth and measurement of electrolyte leakage will be used to evaluate and quantify cold tolerance and survivability of cold tolerant, intolerant and adapted turfgrass species under controlled environment conditions that will include winter temperatures commonly experienced under Michigan winter conditions. Non-structural soluble and insoluble carbohydrate concentrations will be quantified and analysis will be correlated with cold tolerance.

**Duration: first year of 3 years**

**Estimated Costs:** \$15,000/year

**Funding Request for 2006:** \$15,000 for technical support, student labor, supplies, lab analysis, growth chamber space charge (\$4/month/ft<sup>2</sup>), and publication charges.