Physiological response of turfgrass to mowing

Mark Howieson is in the third year of his doctorate work, which is funded primarily by a grant from The Toro Co. The objective of his work is to study the physiological response of grasses to mowing. He's studying such physiological responses as carbohydrate metabolism and the activity of antioxidant enzymes. During 2004, his work has centered on creeping bentgrass and its response to treatments such as double cutting, mower sharpness and mower setting. His work is conducted in the field and in the greenhouse.

The wounding of grass by mowing and other physical damage results in highly active reactive oxygen molecules that can damage the plants cells and affect the plants ability to form carbohydrates, lipids, and other plant chemicals required for proper growth and development. Plants have natural enzymatic systems to remove these reactive oxygen molecules and protect the plant from damage. Howieson's work is designed to study the protective response in creeping bentgrass.

Howieson also is conducting an extensive field trial at Cold Water Creek Golf Course in Ames, Iowa, about the physiological response of creeping bentgrass to mowing with equipment that has been sharpened with different types of reel sharpening equipment.

Howieson plans to complete his work by July of 2005.

Photo: Iowa State University

Mark Howieson's work has focused on creeping bentgrass' reaction to mowing.

SOURCE
Nick Christians, university professor in the horticulture department at Iowa State University, provides updates on five of the major projects under his direction in which graduate students are involved. Each of these relate closely to golf course management and deal with current issues of importance to golf industry.

MORE INFORMATION
More complete information about turfgrass research at ISU can be found at http://turfgrass.hort.iastate.edu/.

Optical sensing identifies moisture, nutritional stress on greens, fairways

Jason Kruse uses optical sensing to identify moisture and stress in turfgrass.

Jason Kruse is in the final year of his doctorate work about remote sensing. This work also is being conducted with funding primarily from Toro.

The overall objective of the work is to use optical sensing techniques to identify moisture and nutritional stresses in grass before it's observed with the naked eye. The specific objectives are to: 1) evaluate various indices reported in the literature as tools for identifying moisture and nutrient stressed turf; 2) develop new indices to be used in detection of moisture and nutrient deficiencies; and 3) determine differences in spectral response of creeping bentgrass, Kentucky bluegrass and perennial ryegrass.

The remote sensing equipment used to collect the data was a field portable fiber-optic spectrometer fitted with 30-degree, field-of-view optics. The tip of the fiber-optic cable is mounted inside a plastic hood that contains two 12-volt halogen lights. Kruse has collected extensive data during a two-year period about moisture stress from perennial ryegrass fairways at Veenker Memorial Golf Course in Ames, Iowa.

He also has data about creeping bentgrass that was treated with varying rates of nitrogen, phosphorus and potassium in separate studies. He's currently analyzing the data using indices that were previously reported in the literature and a new mathematical index that he's developing with help of the ISU departments of statistics and mathematics.

Kruse hopes to complete the work by December 2004.

Cation ratios, soil testing for sand-based greens

Rodney St. John is in the third year of his doctorate studies. He's studying the unique soil conditions that exist in sand-based media such as that found in many golf course greens. His work is supported by a grant from the U.S. Golf Association.

The specific objectives of his work are: 1) to evaluate and correlate several existing soil extraction methods with tissue analysis to determine which type of extractant is best for sand based turfgrass systems; 2) to modify, if necessary, existing extraction methods to better suit turfgrass soil types; 3) to better understand how the basic cation saturation ratio theory and Ca/Mg/K ratios apply to turfgrass systems; and 4) to improve current recommendations for Ca/Mg/K fertilization of turfgrass.

St. John's work during 2004 has been the establishment of proper techniques for the modification of cation ratios in sand media. He's also concentrating on evaluating soil test extractants for use in sand-based systems.

His goal is to complete the work in 2005.

Photo: Iowa State University

Rodney St. John is studying unique soil conditions in sand-based greens.

Methods of establishing Roundup Ready creeping bentgrass on greens, fairways

Luke Dant is in the second year of his master of science work. The objective of Dant's work is to study methods for the establishment of Roundup Ready creeping bentgrass on golf courses. The work is funded by grants from O.M. Scotts.

Roundup Ready creeping bentgrass contains a gene that provides the plants with tolerance to the non-selective herbicide Roundup (glyphosate). Roundup kills most weeds that infest creeping bentgrass turf, including *Poa annua*, a weed for which there are no other effective selective controls.

Dant has conducted a series of studies about the conversion of conventional creeping bentgrass greens and tees, bluegrass fairways, and perennial ryegrass fairways to Roundup Ready bentgrass. He also has conducted studies evaluating various types of equipment for the renovation of creeping bentgrass greens and on the timing and rate of seeding for conversion.

Dant will complete his work in the spring of 2004.

Photo: Iowa State University

Luke Dant is studying the conversion of conventional creeping bentgrass to Roundup Ready bentgrass.

Removal of creeping bentgrass from Kentucky bluegrass roughs

Creeping bentgrass has become popular as a fairway species in the Midwest during recent years. The roughs on these courses are generally Kentucky bluegrass. The contamination of the bluegrass roughs by the bentgrass from the fairways has grown to become a common problem. There are few herbicides that can remove a cool-season grass from a cool-season grass selectively.

Photo: Iowa State University

Marcus Jones is studying the contamination of bluegrass roughs by bentgrass from fairways.

Marcus A. Jones is in the first year of his master of science program and is working on this problem.

The objectives of his works are: 1) to determine the best time of application that provides for selective post-emergence control of creeping bentgrass in Kentucky bluegrass; 2) to determine the rate of application for selective post-emergence control of creeping bentgrass in Kentucky bluegrass; and 3) observe any detrimental effects to the Kentucky bluegrass from the herbicide applications.

Presently, Jones is concentrating on mesotrione, a herbicide from Syngenta that appears to have significant activity on the creeping bentgrass without doing serious damage to the Kentucky bluegrass.

Jones will complete his work in December 2005. GCN