Photo by Ryan Goss

Shifts in glyphosate tolerance in turfgrass weeds

Recent advances in genetic engineering have led to glyphosate-resistant turfgrasses that can be treated with glyphosate to control weeds. There are concerns that glyphosate-resistant weed populations will develop as a result of repeated applications of the herbicide. The objective of this experiment was to determine whether being exposed to and surviving glyphosate applications increases the tolerance of annual bluegrass, dandelion and large crabgrass to glyphosate over several generations. Seeds of the weed species were planted in the greenhouse, encouraged to germinate and grow, treated with glyphosate and allowed to recover, if possible. Seed was collected from surviving plants. The same procedure was repeated for subsequent generations. Generally, plants surviving glyphosate applications produced populations of plants with higher glyphosate survival rates. Glyphosate applications appear to provide a selective pressure to shift the level of glyphosate tolerance in subsequent populations. **— Ryan Goss, Ph.D. (rgoss@unlserve.unl.edu), and Roch Gaussoin, Ph.D., University of Nebraska-Lincoln**

Optimal nitrogen rates and forms for Penn A-4

Penn A-4 is a high-density creeping bentgrass that provides an exceptional putting surface in several geographic regions. Determining fertility requirements and tissue sufficiency levels of Penn A-4 under varying climatic regimes can improve putting surface quality and fertilizer-use efficiency. The objectives of this study are to determine optimal nitrogen foliar rates and forms for maximum quality and growth of Penn A-4. Both topdressed push-up and sand putting greens are treated every other week with nitrogen to provide 0-8 pounds of nitrogen/1,000 square feet/year (0-390.6 kilograms/hectare/year). Forms of nitrogen range from 0% to 100% ammonium and/or nitrate. Under common golf course management practices, preliminary results indicate nitrogen rate and/or form significantly influence color, growth, fertilizer-use efficiency, phosphorus concentration in tissue and micronutrient uptake of Penn A-4. We are correlating growth and color data to tissue nutrient levels to develop definitive nutrient-deficiency thresholds, which will lead to improved recommendations about the optimal rates and forms of fertilizer for Penn A-4. Measured parameters include root length and density, root viability, root-to-shoot ratio, thatch accumulation rate, nonstructural carbohydrate balance and interactions of the above with growth regulator treatments. Results will benefit superintendents managing Penn A-4 putting greens. **— Max Schlossberg, Ph.D. (mjs38@psu.edu), Penn State University**

Photo by Max Schlossberg

Photo courtesy of The Toro Co.

GCSAA/USGA wetting agent evaluation

The goal of the GCSAA/USGA wetting agent evaluation is to provide golf course superintendents with unbiased information on selected wetting agents so they can make informed use and purchasing decisions. The second year of field studies was completed in 2004, and the next steps are to analyze and summarize the data and make the results available. A summary of the results will be published in *GCM* in 2005, and the complete results will be available electronically at www.gcsaa.org. Data from each of the nine evaluation sites will be presented individually. The sites were chosen to represent a wide range of growing conditions. Interested superintendents can review the results from the evaluation site that is most similar to their local conditions. Data will not be analyzed and summarized for all nine sites together. The Environmental Institute for Golf and USGA provided the funding for the study. **— Clark Throssell, Ph.D. (cthrossell@gscaa.org), GCSAA director of research**

Clark Throssell, Ph.D., is GCSAA's director of research.