

serious economic losses if the disease is found to be easily spread and aggressively virulent. Future research will be conducted to gain a thorough understanding of the pathogen epidemiology, biology, infection mechanisms and host range, as well as effective controls.

## **Stop 4. Water Management for Sustainable Creeping Bentgrass and Poa Annua Putting Greens**

Mark Miller, Dr. Kurt Steinke, Dr. Kevin W. Frank, and Dr. Thomas A. Nikolai

Public pressure and constraints on the United States water supply will require changes in golf course putting green management. Although putting greens only represent 3% of the total maintained turf area on United States golf courses, these areas represent some of the most input-intensive managed plant systems. This research study is investigating the effects of three irrigation methods on leachate quantity and quality, irrigation volumes, and putting green performance. Plots are USGA specification putting greens plumbed with plastic lysimeters and planted to A4 creeping bentgrass (*Agrostis stolonifera* L.) and *Poa annua*. Irrigation treatments consisted of daily replacement of 80% evapotranspiration, adjusting irrigation based on root depth, and utilizing soil moisture as determined by a TDR soil moisture probe to schedule irrigation. During 2010, data showed that irrigation based on soil moisture led to significantly greater irrigation and leachate volumes. However this treatment also resulted in significantly less dollar spot during the growing season. Localized dry spot was significantly greater on the soil moisture based irrigation treated plots on 9 out of 17 dates. Ball roll was also significantly greater in July for the daily ET treatment. Preliminary data suggests that alternating between the three irrigation treatments during the growing season may lead to reduced water usage and better putting green performance.

## **Stop 5. Nitrogen Carrier Effects on Creeping Bentgrass Grown on Three Rootzones**

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Research on the multi-year effects of foliar and granular nitrogen fertilizers alone or in combination on turfgrass tissue and soil nutrient concentrations is limited. The research objective was to determine the effect of different foliar and granular nitrogen fertilizers on creeping bentgrass grown on three putting green rootzones. Research was initiated in 2009 at the Hancock Turfgrass Research Center. The fertilizer treatments were urea, methylene urea, natural organic, foliar alone, foliar + granular, and an untreated control. All fertilizer treatments were applied from May through October to Penn 'A-4' creeping bentgrass grown on three rootzones. The three rootzones were a United States Golf Association specification rootzone, sand/peat/soil rootzone (80-10-10) and a native sandy clay loam. The urea, methylene urea, and natural organic fertilizer treatments were applied at 0.5 lb N/ 1000 ft<sup>2</sup>/month. The foliar treatment was applied at two rates, 0.25 lb N/ 1000 ft<sup>2</sup>/month, and 0.5 lb N/ 1000 ft<sup>2</sup>/month. The foliar + granular treatment consisted of a granular fertilizer application once a month at 0.25 lb N/ 1000 ft<sup>2</sup> and a foliar application twice a month at 0.12 lb N/ 1000 ft<sup>2</sup>/application. Soil

and tissue samples were collected in October 2009, and June and October 2010. Results indicate that fertilizer treatments resulted in higher tissue N, P, and K levels than the untreated control for the October 2009 and 2010 samplings. However, the untreated control had higher tissue Ca, Mg, Mn, and Fe levels than the fertilized treatments. Among rootzones, higher soil N, P, and K values did not result in higher tissue N, P, and K values. After two years, there was no significant decrease in soil nutrient values for the foliar alone treatments, with the exception of nitrate-N which decreased from October 2009 to 2010.

## **Stop 6. Green Speed and Slopes: Golfer Survey**

Dr. Thomas A. Nikolai

How do golfers perceive green speed? Certainly there are many factors that influence the perception of green speed and slope might be the greatest influence. This stop will take a break from research plots and allow participants to participate in a survey by putting up and down a slope and determining green speed.

## **Stop 7. Fairway and Approach Rolling Programs to Decrease Pesticide Inputs and Enhance Playing Quality.**

Thomas Green, Dr. Thomas A. Nikolai, Dr. J.M. Vargas, Jr., N. Dykema and Dr. John N. Rogers, III

Ten-years ago very few golf courses rolled their putting greens on a regular basis due to the belief that this cultural practice was detrimental to turfgrass health and the underlying root zone. Currently, the majority of golf courses in our country roll their greens on a weekly basis, many at a frequency of three times per week, or greater. This increase in lightweight rolling may be directly attributed to a United States Golf Association (USGA) funded study performed at Michigan State University (MSU) from 1996-2000. Significant contributions from that study include that lightweight rolling decreased dollar spot, brown patch, localized dry spot, and broadleaf weeds, while increasing turfgrass rooting without increasing compaction on a regularly top dressed green.

Given all those benefits, the truth remains that lightweight rolling is performed primarily to increase green speed because, although a reduction in dollar spot incidence was afforded, even a small percentage of dollar spot on a putting green is viewed as unacceptable due to the nature of the game. However, the same amount of dollar spot that may be unacceptable on a putting surface could be viewed as acceptable on a fairway, particularly if fungicide applications are reduced and/or methods of rolling are efficient.

In 2011, MSU initiated a study to investigate the viability of rolling fairway/approaches to determine if the mechanical practice can reduce turfgrass pests in the fairway and result in firmer landing to improve playing quality. While it may seem intuitive that benefits from lightweight rolling on the putting green would be duplicated on a fairway, this may not be the