UNIVERSITY TURFGRASS RESEARCH UPDATE

Editor's note: *In our December 2009 and February 2010 issues we published reports from some leading turfgrass researchers in the US on their current studies. For this issue we asked the same academics to update us on those projects and inform on new ones.*

NORTH CAROLINA STATE UNIVERSITY

Athletic Field Turf Paint Impacts Light Spectral Quality and Turfgrass Photosynthesis. Doctoral graduate student Casey Reynolds has been investigating chronic declines in turfgrass health and quality from repeated applications of athletic field paint. Studies have evaluated photosynthesis response to paint as well as the transmission, reflectance, and absorption of light based on paint color, dilution, and thickness. Results have proven that paints will differentially reduce photosynthesis based on color and dilution. This research has allowed us to rank common paint colors along a scale that shows their potential to reduce photosynthesis.-Grady Miller and Casey Reynolds, Crop Science Department.

Evaluation of Athletic Field Paint Application Methods. Master of Science student Drew Pinnix initiated his research in fall 2011 with the primary objective to determine if he can influence paint and turfgrass performance using different paint application techniques. A series of studies have been designed to test several hypotheses related to application pressures, directional application, paint thickness, various additives, timings, and products. Many of these trials conducted over the next 2 years will use information gained from previous work on spectral quality and photosynthesis.-Grady Miller and Drew Pinnix, Crop Science Department.

As a follow-up project from a few years ago, we are planning another **broad-based screening of green turf colorants as an alternative to overseeding warm-season turfgrasses**. We evaluated 12 green turf colorants on dormant grasses a few years ago with great results. In the past 3 years at least a dozen new products have been released on the market. Drew Pinnix and Scott Brinton will be screening these new products alongside the old products on athletic field height of cut and putting green height of cut. Several new data points will be collected this time around, including more detailed look at application timing and color-fastness of these products.-Grady Miller, Drew Pinnix, and Scott Brinton, Crop Science Department

Compiled by Dr. Grady Miller

AUBURN UNIVERSITY

Research in turfgrass nutrition has focused on pathways of N loss in fertilized turfgrass. Because of the ever-increasing interest in the potential of nutrient loss from fertilized turfgrass we have conducted many studies that examine the loss of N via downward movement, or leaching. If fertilized correctly (both rate and source) we rarely find significant nitrate-N loss from fertilized turfgrasses. Another path of N loss is volatilization, which is the loss of applied N as ammonia to the atmosphere. Our work using large-scale plots has shown reduced N loss from volatilization when N sources other than urea are used. Last, we continue to conduct work in the area of foliar fertilization, focusing on both sources and application rates.-Dr. Beth Guertal

I am doing work on Roundup tolerant ryegrass, known as Gly-Rye, a product of Jacklin Seed. We are finding that these cultivars have a significant degree of glyphosate tolerance. Utilizing these cultivars would allow for use of glyphosate to control *Poa annua* and other weed species. There is potential to apply 0.5 to 1.0 lb ae/a of glyphosate with little to no injury to ryegrass and excellent *Poa* control. Timing is critical for control and I am currently trying to address the need to tank-mix with other herbicides to potentially prevent herbicide resistance development.

I am also researching other herbicides for *Poa annua* control. Two primary herbicides are amicarbazone and methiozolin. These herbicides must be timed properly for appropriate turfgrass safety and *Poa* control. I am seeing a lot of positive things from both of these products and they will greatly benefit the turf industry in the future.-Dr. Scott McElroy

UNIVERSITY OF MASSACHUSETTS

The University of Massachusetts Turf Program conducts a wide range of research at both the UMass Joseph Troll Turf Research Center as well as at various field sites throughout the northeast. Our goal is to enhance the functional use of turfgrasses while reducing the environmental impact of turf management practices. Presented below are summaries of selected projects of particular interest to sports field managers. Items were compiled by Mary Owen, extension turf specialist.

Wear Trials in Perennial Ryegrass and Kentucky Bluegrass Maintained Under Close Height of Cut, by J. Scott Ebdon, PhD. These are new trials that

include a perennial ryegrass test established in the fall of 2010 to assess the wear tolerances among 88 perennial ryegrass entries maintained under close height of cut (0.375 inch). In 2011, the following perennial ryegrass entries provided the best wear tolerance: 2NJK, APR-2036, BAR Lp 10970, DLF LGD-3022, GO-PR60, IS-PR 479, JR-192, and PST-2A G4. Many of the more wear tolerant entries exhibited higher shoot densities and better overall turfgrass quality under close height of cut. This wear study will continue over the next three growing seasons. A new wear trial was also established in the fall of 2011 to assess the wear tolerance of 82 Kentucky bluegrass cultivars. These entries will be assessed for their wear tolerance over the next four growing seasons beginning in the spring of 2012. Sponsor: National Turfgrass Evaluation Program

Efficient Irrigation for Recreational Turf in New England: Evapotranspiration and Crop Coefficients, by J. Scott Ebdon, PhD and Michelle DaCosta, Ph.D. This is a relatively new test that was planted in the fall of 2009 to measure evapotranspiration (ET) losses from pure stands of Kentucky bluegrass (Touchdown) and perennial ryegrass (Exacta) maintained at sports grass height of cut (1.25 and 2.5 inch), and creeping bentgrass (Memorial) maintained at fairway (0.375 inch) and greens height (0.125 inch). Different N fertility rates including 2 and 4 pounds per 1,000 ft2 are also being compared. Daily and monthly crop coefficients (Kc) derived from reference ET values from weather stations and actual turf ET are being measured during the summer irrigation season. Crop coefficients are values used to estimate ET rates for specific crops, in this case, for various turfgrass species and cultivars.

After 2 years of study the effect of N and height of cut within the species had little influence on ET and Kc values. However, Kentucky bluegrass as a species exhibited significantly higher ET and higher Kc values than perennial ryegrass, and in turn, perennial ryegrass exhibited higher ET rates and Kc values than golf turf. In other words, Kentucky bluegrass used more water than perennial ryegrass which used more water than creeping bentgrass.

When the study is completed in 2013, these results should provide reliable Kc values that can be used to assist turf managers in applying irrigation water more efficiently to sports and golf turf in the cool-humid New England region. Sponsors: New England Regional Turfgrass Foundation and the United States Golf Association.

Improving Winter Hardiness of Perennial Ryegrass, by Michelle DaCosta, Ph.D. and J. Scott Ebdon, PhD. Perennial ryegrass is a cool-season turfgrass species that is widely used on athletic fields due to its rapid establishment and superior traffic tolerance. Compared to other cool-season turfgrasses, however, perennial ryegrass can be susceptible to freezing injury in northern climatic regions. In one study, we evaluated different perennial ryegrass accessions with varying levels of freezing tolerance, and identified specific protective compounds that were associated with better freezing tolerance. Based on this research, we have conducted additional studies to exploit the accumulation of protective compounds during cold hardening in perennial ryegrass. For example, we determined that exposing plants to mild drought stress

through application of wilt-based irrigation could induce the production of beneficial compounds during cold hardening, such as sugars and proteins. As a result, wilt-based irrigation also resulted in improved freezing tolerance of some perennial ryegrass cultivars. Additional research is underway to improve management practices aimed at improving freezing tolerance of perennial ryegrass. Sponsors: New England Regional Turfgrass Foundation, USGA, O.J. Noer Research Foundation, Adirondack Golf Course Superintendents Association.

This technology is capable of removing fertilizer, pesticide and hydrocarbon residues from wash water, thus allowing it to be reused or safely released back into the environment.

The Use of Constructed Wetlands for Reclamation of Wash Water for the Turf Industry, by Lesley Spokas, PhD, Michelle DaCosta, PhD and J.S. Ebdon, PhD. There is increased pressure on the turf industry to use more environmentally sustainable approaches in turf management. To that end, constructed wetlands have the capacity to remove significant amounts of organic matter, nutrients, heavy metals, and pesticides through chemical, physical, and biological processes. In 2011 we constructed an artificial wetland onsite at the UMass Turf Research Center for the primary purpose of remediating wash water used on turf machinery. Because the surface of the constructed wetland is composed of sand with selected vegetation, equipment such as mowers and sprayers will be washed down directly on the wetland area. This technology is capable of removing fertilizer, pesticide and hydrocarbon residues from wash water, thus allowing it to be reused or safely released back into the environment. Treatment wetlands have few if any electrical or mechanical parts and are either carbon neutral or have a "positive" carbon footprint since plants consume carbon dioxide and produce oxygen while treating the waste. The information gathered over the next several years during grow-in and field use will be used as part of a larger set of best management practices for minimizing the impact of pesticide and nutrient use on water and soil quality.

Tolerance of Kentucky bluegrass Cultivars to the Herbicide Velocity-Bispyribac-Sodium, by J. Scott Ebdon, PhD and Prasanta Bhowmik, PhD. This study assessed Kentucky bluegrass tolerance to the herbicide Velocity, which is a useful compound in the control of annual bluegrass. In this test 110 cultivars maintained at 1.25 inch height of cut were evaluated for their herbicide tolerance. Velocity was applied at 0.05 ounces per acre on 29 June, 2011. Visual injury was assessed weekly (using a 1 to 9 rating scale with 9=no injury) following treatment, with the greatest injury occurring 4 weeks after treatment (4WAT). Injury ratings at 4WAT ranged from 2.0 to 8.7. The following cultivars exhibited good tolerance to Velocity (ratings of 6 and higher) at 4WAT: Aries, Bewitched, Blueberry, Everglade, Hampton, Midnight and Mystere. Sponsor: National Turfgrass Evaluation Program

In addition, the UMass faculty and staff are conducting a number of other research projects spanning the gamut of disciplines within the field of turf management. These include: management of dollar spot and snow mold; fungicide resistance management; breeding for disease resistance; effects of wetting agents on drought resistance and recovery; various weed management trials; annual bluegrass weevil, oriental beetle and turf damaging nematode management; reducing pesticide exposure to turf users; and protection of water resources from turf management materials. For more information on these and other projects, visit the UMass Turf Program website at www.umassturf.org and click on Research.

PENN STATE

At Penn State's Center for Sports Surface Research, we continue to focus on both natural and synthetic turf research. We have a number of exciting projects underway and look forward to new projects that are already planned for the spring. The research section of our website includes links to many of our studies along with other related research (http://cropsoil.psu.edu/ssrc/research).

Natural Turf Research Projects: Trinexapac-ethyl on sports turf. Since our last research update, we have completed our second study evaluating the effects of trinexapac-ethyl (TE) applications on the divot resistance of Kentucky bluegrass athletic fields. Our results showed that applying TE monthly from May through July improved divot resistance in the fall by up to 20%. TE improved divot resistance most on a high-sand rootzone, but benefits were also found on native soil. Results from our studies indicate that the application TE throughout the spring and summer serves to "pre-stress condition" the turf before fall play by increasing tiller density and rooting. Our studies simulated fall-only turf use, such as on a stadium field. A TE program is not recommended for high-use fields under continuous play.

The new tall fescue—a viable option for sports turf?

The current generation of turf-type tall fescue may offer an acceptable alternative to perennial ryegrass and/or Kentucky bluegrass on athletic fields in certain situations. We are investigating summer establishment methods that maximize turf coverage at the end of the fall playing season. We are looking at various seeding rates (6 to 18 lbs/1000 ft2) and several nitrogen rates (2 to 7 lbs /1000 ft2). Initial results show that for a short establishment period (10 weeks before use), a low seeding rate and a high nitrogen rate maximize turf coverage later in the fall (after fall field use). For a longer establishment time, higher seeding rates and lower nitrogen rates provided the greatest turf coverage in late fall. We have also observed that tall fescue was less traffic tolerant than perennial ryegrass when traffic was initiated 10 weeks after seeding. However, when traffic was initiated 14 weeks after seeding, all turf-type tall fescue exhibited greater traffic tolerance than perennial ryegrass.

Perennial ryegrass traffic tolerance. As part of the NTEP program, we are evaluating the traffic tolerance of all perennial ryegrass cultivars in the current trial. While we are excited to see how each cultivar per-