TURF-RELATED RESEARCH AT THE UNIVERSITY OF MASSACHUSETTS AMHERST

Editor's note: *Thanks to Scott Ebdon, PhD, professor, agronomy-turfgrass science, Stockbridge School of Agriculture, University of Massachusetts, for providing this update:*

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 that may be of particular interest to sports turf managers.

Wear Trials on Natural Grass Tennis Courts, by J. Scott Ebdon, PhD, Michelle DaCosta, PhD, and William Dest, PhD. Three official size single courts (78 by 27 ft.) were established with each court evaluating the same eight species and cultivars: Rubix Kentucky bluegrass, Keeneland Kentucky bluegrass, Karma perennial ryegrass, Wicked perennial ryegrass, Puritan colonial bentgrass, 007 creeping bentgrass, Villa velvet bentgrass and the Chambers Bay Dunes mix (creeping red and Chewings fescue). The study is maintained at 0.45-inch height of cut (HOC). Net posts and base lines will be installed to allow for natural wear from actual match play as well as simulated wear from machines to be applied beginning in the spring of 2017. Professional maintenance personnel from the Longwood Cricket Club (Director of Grounds Mike Buras and crew) have been assisting in the court design and installation. In addition, surface characteristics such as ball bounce resiliency, ball roll, surface hardness (firmness), physiological and morphological measurements, and water use as evapotranspiration from the different species-cultivar surfaces will also be measured. Sponsor: New England Regional Turfgrass Foundation.

Wear Trials in Fine-Leaf Fescue and Bentgrass Golf Turf, by J. Scott Ebdon, PhD. Evaluations were conducted on some 42 entries of fine-leaf fescue as part of the National Turfgrass Evaluation Program (NTEP) test. Many of the more wear tolerant cultivars were cultivars of hard fescue, followed by Chewings fescue, with creeping red fescue among the least tolerant species-cultivars to wear. Wear was applied using 90 passes with a grooming brush during each season including spring, summer, and fall. Perennial ryegrass checks were also included in the fine fescue test which showed that the all fine fescue species and their cultivars were not as tolerant as perennial ryegrass. In the golf fairway test maintained at 0.375 inch HOC most colonial and creeping bentgrass species that were most tolerant of wear (50 passes of the grooming brush) were experimental cultivars. Generally, creeping bentgrass entries were superior to colonials in their tolerance to wear. Similarly for the NTEP greens test (0.125 inch HOC), experimental cultivars were superior in their overall tolerance to wear. All of these NTEP wear trials will continue over the next two growing seasons. A new (NTEP) wear trial was also established in the fall of 2016 to assess the wear tolerance of some 114 perennial ryegrass cultivars. These 114 entries will be assessed for their wear tolerance over the next four growing seasons beginning in the spring of 2017. Sponsor: National Turfgrass Evaluation Program.

Organic Land Care Practices in Maintaining Sustainability of Athletic Field Turf, by William Dest, PhD and J. Scott Ebdon, PhD. The objective of the study is to examine the long-term effect on turfgrass sustainability, playing quality characteristics and soil quality. An organic land care system (compost tea, corn gluten) for athletic fields is being compared to a conventional (synthetic) maintenance system using Integrated Pest Management. After 4 years of

Tennis grass courts at UMass-Amherst showing two of three experimental single-courts.

UMass-Amherst: Height of cut was the single most import factor affecting ET and Kc values in the irrigation of recreational turf.

study, the significant ingress of crabgrass and clover into the organic management system diminished wear tolerance, and recovery while summer patch disease was suppressed by the organic management system. There was significantly higher soil organic matter and soil available P (well above optimum) introduced with the organic management system compared to the conventional system. Soil physical properties such as soil infiltration rates, soil stability, aeration porosity and soil bulk density were unaffected by the two management systems. Sponsor: New England Regional Turfgrass Foundation.

Efficient Irrigation for Recreational Turf in New England: Evapotranspiration and Crop Coefficients, by J. Scott Ebdon, PhD and Michelle DaCosta, PhD. This is a recently published study 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 and lawn grass height of cut (1.25 and 2.5 inch, respectively), 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 per year were also compared. Daily and monthly crop coefficients (Kc) derived from reference ET values from a near-by weather station and actual turf ET (weighing lysimeters) were measured during the summer irrigation season. Crop coefficients are values used to estimate ET rates for specific crops, in this case, for turf under different HOC and N. After 4 years of study the effect of HOC was the single most important cultural factor affecting ET and Kc values. Golf green and fairway turf used as much as 20% less water than taller HOC sports and lawn turf. Taller fairway HOC and lawn HOC turf used only 5% more water than their shorter HOC counter part maintain as either green or sport grass HOC. Fertilizing in summer with as much as 1.0 lb. N/1,000ft2 had little influence on turf water use because most of the total N used was in a slow-release form (i.e., 80%). Diminishing leaf growth rates and leaf area is one of the most effective strategies for lowering water use from recreational turf. Sponsors: New England Regional Turfgrass Foundation and the United States Golf Association.

Improving Winter Hardiness of Annual Bluegrass Golf Green Turf, by Michelle DaCosta, PhD and J. Scott Ebdon, PhD. Annual bluegrass is a cool-season turfgrass species that is problematic on short cut turf such as golf and athletic turf due to its sensitivity to low temperature and ice cover. Different pigments and plant growth regulators and their rates are being compared to assess their effectiveness in preventing winter

injury especially during the transition from late winter to early spring. This research is currently under investigation but early results indicate that some pigments and PGRs may increase low temperature injuries. Sponsor: New England Regional Turfgrass Foundation.

Organic Fertilizer Promoted Mobility of Phosphates on Sand-Based Golf Green Turf, by Baoshan Xing, PhD and J. Scott Ebdon, PhD. This is a recently published study investigating natural organic fertilizer and the effects of dissolved organic carbon (DOC) from plant and animal residues and their potential to promote mobility of phosphates. Sand rootzones are especially prone to leaching because of their poor soil moisture and nutrient retention capacities. Biosolids, like Milorganite, where shown to significantly increase mobility of phosphates in large part because biosolids contained 3 times more DOC when compared to other natural organic N-sources or synthetic N-fertilizer. The presence of DOC in fertilizer or composts was shown to promote greater phosphate mobility. The results will be used to develop BMPs and DOC guidelines to diminish phosphate mobility for natural organic fertilizers and composts. Sponsor: New England Regional Turfgrass Foundation.

Simulated wear-tracking and associated injuries on the 2014 NTEP fine-leaf fescue test at UMass-Amherst. Note the more wear tolerant perennial ryegrass check-plots in the immediate foreground.

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 the remediation of 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 can 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.

Kentucky bluegrass drought research at UMass Amherst. Cultivars are evaluated under irrigated and non-irrigated conditions using an automated rainout shelter. Total irrigation amounts and frequency to maintain acceptable quality lawn and sports turf are being measured.

Constructed wetland at UMass Amherst. Testing is underway to evaluate effectiveness of an artificial wetland system to remove contaminants (e.g. nutrients, pesticides) associated with wash water from spray equipment and mowers.

Current data and information that is being gathered 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. Sponsor: New England Regional Turfgrass Foundation.

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: (1) studies conducted by Geunhwa Jung, PhD including rolling studies in the management of dollar spot; fungicide management of snow mold; and fungicide resistance management (2) studies conducted by Michelle DaCosta, PhD including the screening for drought resistant cultivars; quantifying ET and irrigation frequencies of turfgrass species (3) studies conducted by Pat Vittum, PhD including the biology and management of annual bluegrass weevil, oriental beetle and other turf damaging insects and (4) studies conducted by Robert Wick, PhD on nematode management and biological alternatives to nematicides in reducing pesticide exposure to turf users. For more information on these and other projects, visit the UMass Turf Program website at www.umassturf.org and click on Research. ST