Improving turfgrass

U.S. GOLF ASSOCIATION-FUNDED RESEARCH PROJECTS HELP ENHANCE TURF CONDITIONS ON GOLF COURSES

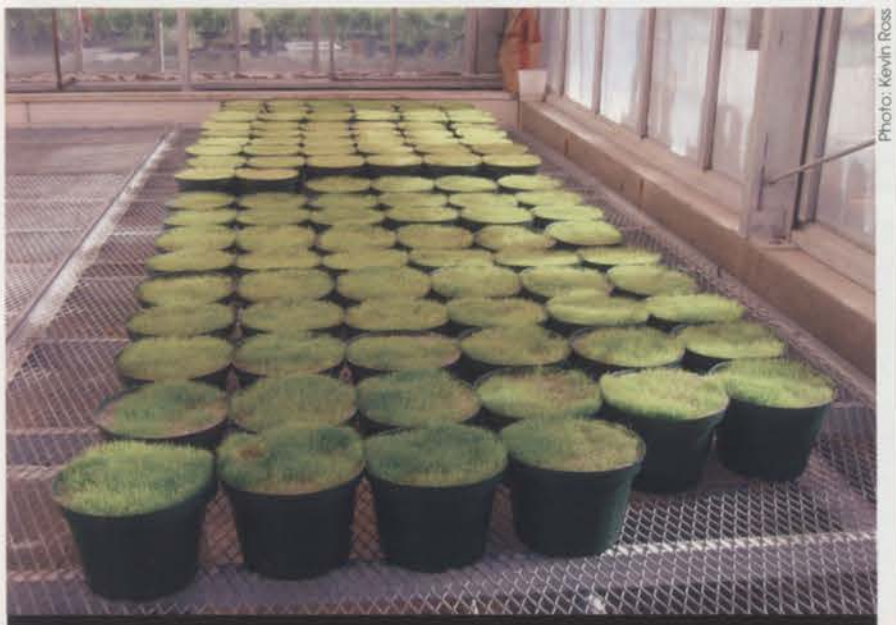

Photo: Kevin Ross

Much research takes place at universities throughout the country in greenhouse settings year round.

by KEVIN J. ROSS

There's no disputing that golf course conditions have change immensely throughout the past 25 years. Nowadays, golf courses are maintaining turfgrass at a level that wasn't possible years ago. Why is this? Certainly, one of the biggest reasons is the advancement of technologies used on golf courses. From mowers to irrigation to pesticides, the advancements have been considerable.

However, turfgrass research is one area that often isn't mentioned with all the advancements. With the current movement toward less pesticide and water use, to name a couple, turfgrass research will improve golf's future.

USGA-backed research

One of the biggest supporters of turfgrass research is the U.S. Golf Association. Throughout the years, the USGA has given millions of dollars to support research conducted throughout the country. Since 1983, the USGA has funded more than 290 university research projects at a cost of about $25 million. The research findings of these projects have benefitted the game of golf and golf course superintendents throughout the world.

The USGA has helped develop research projects that, in turn, will reduce the amount of chemicals applied to turfgrass on golf courses without affecting the playing quality of it. From 2003 to 2005, the USGA is supporting 52 turfgrass and environmental projects. Even with the large amount of projects that are important to the industry, it seems like there are some favorites that dominate the talk among superintendents.

The development of new turfgrasses is one hot-button research topic for superintendents who continually are looking for better turfgrass varieties to improve performance. This is an area in which the USGA has concentrated funding for many years.

The National Turfgrass Evaluation Program is considered one of the most popular programs among golf course superintendents. The USGA has helped fund this program since 1997. The main purpose of the NTEP is to evaluate the commercially available cultivars and new market selections of various species. Basically, it's an independent and unbiased method of gathering performance data about various seed companies' cultivars.

Photo: U.S. Golf Association

Working with breeding greens-type *Poa annua* has unveiled remarkable density with some selections.

With the flood of cultivars from many turfgrass species on the market, it's almost impossible for superintendents to evaluate them on their own. The program is a way to evaluate cultivars to determine what's best adapted for a particular region and if it meets superintendents' specific needs.

The USGA funding for the NTEP, along with funding from the Golf Course Superintendents Association of America, helped initiate a three-way cooperative effort for the "On-Site Testing of Bentgrass and Bermudagrass Cultivars for Golf Course Putting Greens" project, which ran from 1997 to 2001. Test greens were built in 16 locations throughout the United States for evaluation under playing and practice conditions. Trials were located in northern regions for bentgrass testing, in southern regions for Bermudagrass testing and in the transition zone to evaluate both grasses at one site.

Although the bentgrass and Bermudagrass research has been completed, the results are available still. This work was so popular that the program is tentatively scheduled to begin again. All past NTEP testing and present ongoing work is available on the NTEP's Web site, www.ntep.org, where one can view data from all the trials.

Disease resistance

Another example of turfgrass development is the breeding program at Rutgers Univer-

sity. Since 1983, the USGA has been funding the "Breeding and Evaluation of Kentucky Bluegrass, Tall Fescue, Perennial Ryegrass and Bentgrasses" study. The main focus of the research has been to improve the genetics of these turfgrasses by increasing stress tolerance and disease and insect resistance, which results in the reductions of pesticide and fertilizer use.

Unknown to many, in 1990, the USGA funded a grant to Rutgers University to study whether the glyphosate resistance gene being developed in agricultural crops also could be inserted into turfgrass. Hence, the birth of what the industry now knows as Roundup Ready bentgrass. The initial foresight for Roundup Ready bentgrass was to lower pesticide input.

If weed control could be established for creeping bentgrass, then only one pesticide regimen was needed. If bentgrass could dominate the stand with the use of glyphosate, then other grasses that have their own inherit problems, such as *Poa annua*, perennial ryegrass and Kentucky bluegrass, could be eliminated and less pesticides would be needed.

Photo: Kevin Ross

Evaluation of turfgrasses is a hot-button topic for superintendents.

Improving *Poa annua*

Quite possibly the breeding program that has developed the most discussion among superintendents and industry professionals, aside from Roundup Ready bentgrass, is the work being done by Dr. David Huff at Penn State University on "Cultivar Development and Extreme Temperature Tolerance of Greens-type *Poa Annua*."

For some people in golf course maintenance business, it's hard for them to believe the enemy could be a friend someday. Many contend, even in the current world of superior bentgrasses for greens, that when *Poa annua* is good, there might be no finer putting surface. But the inherent problem of *Poa annua* is that it's only good for a short time. The research for this project has evaluated tens of thousands of *Poa annua* plants, which have been taken from golf greens from throughout the world. These selections have been looked at for heat and cold stress, disease resistance, shoot density, color and appearance.

Of the thousands of plants that have been selected for observation, Penn State has narrowed its work to a top 12, which currently are being evaluated at golf courses and university facilities throughout the world. Many of these selections have some of the finest texture and density ever evaluated for putting-green turf. Will superintendents be growing "greens-type *Poa annua*" on their greens some day? It will still take many years if that becomes the case, but this breeding program might make it possible.

Photo: U.S. Golf Association

Bentgrass- and Bermudagrass-greens testing was one of the most popular research studies among superintendents.

Reducing pesticides

One research grant, which has developed much interest, is the "Evaluation of Reduced Chemical Management Systems for Putting Green Turf," conducted by Jennifer Grant, Ph.D., and Frank Rossi, Ph.D., of Cornell University. This research was conducted at the public Bethpage State Park on the Green Course in Farmingdale, N.Y. The research was performed on push-up-style greens, which had accumulated a heavy, sand topdressing layer.

The focus of Grant's and Rossi's project was to evaluate integrated pest management techniques and reduce or eliminate chemical inputs to determine the feasibility to

Photo: U.S. Golf Association

Dr. David Huff found diversity with *Poa annua's* density during his research of the turfgrass.

manage acceptable golf greens under these management regimens. This project was the direct result of various public pressures to manage golf courses with few or even no pesticides. Extensive data from the project was collected from a three-year period ending in 2003.

To generalize their major findings, it has been determined that integrated management greens received less pesticides (27 percent to 46 percent), and non-chemical greens were marginally or below acceptable quality during the stressful months of July and August and even needed emergency chemical treatments.

Photo: U.S. Golf Association

The turfgrass research conducted on push-up-style greens at Bethpage State Park in Farmingdale, N.Y., generated public interest.

Possibly the best news from this project is the influence the research has had on various advocacy groups. Some state county groups have even reassessed their pesticide restrictions and written new policies that are now based on scientific research.

Ball-mark concerns

There also has been what can be termed research by demand. As the new creeping bentgrasses have hit the markets throughout the past 15 years, there suddenly was the major concern of a ball-marking problem with the new bentgrasses. Word traveled that the A and G series, L-93 and other varieties of bentgrasses healed slowly and ball marks would be a considerable problem if these bentgrasses were used.

The USGA decided to fund a research project, "Ball Marks on Bentgrass," to gather scientific based data on this problem. The study showed the new bentgrasses, such as A-4 and G-2, ranked as the top two bentgrasses in recovering from ball marks. Thirteen bentgrasses and two velvet bentgrasses were studied.

The real ball-marking problem was determined to relate more to the maturity of the turfgrass and the development of a thatch and topdressing matrix layer rather than the cultivar. With the proliferation of new golf courses seeding these bentgrasses, this can explain some of the initial concern of the ball-mark healing problems. It's interesting to note this project proved a complete reversal of public thinking and perception of the issue.

Organic accumulation

Another example of proactive funding by the USGA is the project conducted by Robert Carrow, Ph.D., from the University of Georgia. His work, titled "Surface Organic Matter in Bentgrass Greens," addressed the dynamics of thatch formation in relation to the performance of a USGA-specified green. Although this is a highly scientific study, the end results have provided a useful tool for superintendents to analyze greens performance and design cultural practices based on the data.

The research results indicated the potential breaking point for green performance being a 4-percent organic matter accumulation in the top two inches near the surface. Carrow noted that organic matter accumulation greater than 4 percent rapidly decreased green performance characteristics such as oxygen diffusion rates, saturated hydraulic conductivity and excessive surface water retention. He also stressed that the 4-percent organic matter be a guideline and not a rule.

With this research, maybe the focus now will be to analyze the organic-matter level in the upper two inches, instead of thinking about the surface percentage removed during cultivation.

Extensive research

The material mentioned above represents a small fraction of the USGA's work. The USGA is dedicated to turfgrass research and to increasing awareness of the work being performed among industry professionals. Although some of the research might not pertain to a particular region, there's extensive work that can benefit the industry as a whole. For in-depth information about USGA research projects, both past and present, visit www.usgatero.msu.edu/currentpastissues.htm. GCN

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