Improving Bentgrass Heat Tolerance

University of Nebraska and the USDA are evaluating a diverse collection of wild bentgrasses from warm and arid climates.

At Rutgers University, the USGA supports scientists developing heat- and drought-tolerant bentgrasses. Scientists are also looking for promising gene markers related to bentgrass summer performance: chlorophyll proteins, heat shock protein and an antioxidant gene correlated with heat tolerance.

Two creeping bentgrass populations established at Rutgers and the University of Georgia contained 144 plants. The populations are a diverse collection from breeding programs at the two universities. The research also included the creeping bentgrass cultivars 'Penncross', 'Crenshaw', 'Declaration', 'Penn A-4' and 'Luminary'. The goal was to confirm the usefulness of the molecular markers developed to predict heat tolerance.

The research team rated turf plots at both locations for heat tolerance during summer. Characteristics evaluated included turf quality, membrane stability, chlorophyll content and infrared images. Additionally, the scientists digitally analyzed turf plot images for turf color and density.

One-third of new bentgrass lines outperformed the best-performing cultivars examined in the trials. DNA analysis identified similar gene markers for heat tolerance within the test populations. These results provide some confirmation of the usefulness and stability of molecular markers as indicators of heat tolerance. The researchers are now evaluating

drought tolerance using rain-out shelters at both locations. They will screen bentgrass DNA for useful molecular markers for drought tolerance.

The University of Nebraska and the United States Department of Agriculture are evaluating a diverse collection of wild bentgrasses from warm and arid climates. They obtained 69 different plant introductions from the USDA-Agriculture Research Service Germplasm Resources Information Network. Like many turfgrasses, the bentgrass genus (*Agrostis* L.) represents more than 150 species. Only five species of *Agrostis* are commonly used on U.S. golf courses. Creeping bentgrass (*Agrostis stolonifera* L.) has the most widespread use.

Scientists provided minimal inputs in their studies to identify plants that persist. At the end of the two-year evaluation period, many plant introductions did not survive. The majority of accessions (49) had less than 50 percent plot coverage under mowing. Two of the remaining 20 plant introductions (*A. gigantea* and *A. clavata*) performed well as a rough. Accessions that thrive at higher heights of cut in resource-limiting conditions may serve as low input golf course roughs.

Together these data highlight the variability among a diverse collection of bentgrasses. The tests demonstrate that these plant introductions possess characteristics that may have commercial value and contribute to bentgrass sustainability. The research will be continued in Nebraska for several years to evaluate long-term persistence of these bentgrass plant introductions.

Source: Dr. Bingru Huang, Rutgers University; and Dr. Keenan Amundsen, University of Nebraska

Additional Resources:

Gene Markers for Creeping Bentgrass Heat and Drought Tolerance

Low Input Performance of Highland, Heat, and Drought Tolerant Bentgrasses