## How Do Turfgrasses Survive Drought?

The 1999 season in the Northeast US raised the topic of water use for turfgrass management. Discussion of this topic usually includes water use issues and management to survive drought, however, rarely includes a discussion of how the plants that seem to need water, survive or persist without water. If we understood how turfgrasses respond to drought stress on a physiological basis, it might be possible to breed more drought tolerant grasses, that require less water.

Researchers at Kansas State University have been investigating the physiological responses of various tall fescue cultivars to drought stress. The researchers compared dwarf-type tall fescue cultivars (Rebel Jr. and Bonsai) and turf-types (Falcon II, Phoenix and HoundogV) to the forage type (Kentucky 31) under well watered and drought conditions (35 days without water). Surprisingly, cultivars within the same tall fescue classification responded in different ways regarding how the plants produce energy and manage their internal water content. Specifically, Falcon, Houndog and K-31 were the most effective in tolerating drought from the measured parameters. Interestingly, the cultivars that appeared the most drought tolerant were able to maintain energy production (photosynthesis) under stress. This information will be helpful in selecting drought tolerant cultivars and for breeders to develop new cultivars with specific physiological traits.

*(From: Huang, B. and H. Gao. 1999. Physiological responses of diverse tall fescue cultivars to drought stress. HortScience 34: 897-901.)*



## Managing Turf Diseases With Fertilization

As the pressure has increased to reduce chemical pesticide control of turfgrass pests, researchers have continued to uncover the complex relationship among plants, nutrients and microbes. Historically, the use of plant nutrients for pest management was commonplace with the use of metal-based fungicides such as copper. In addition, forage grass research has provided information that has been easily transferred into turfgrass management practices.

Take-all patch of creeping bentgrass has become a more prevalent turfgrass disease in the last decade as a result of increased construction of new greens and the use of high pH sands in greens construction. Researchers at Rutgers University have investigated the relationship between take-all patch of creeping bentgrass and Manganese (Mn) nutrition. Plots were established on a sand-based fairway of Penncross and Penneagle creeping bentgrass with a history of take-all infestation were treated every 4 weeks (except Dec., Jan., Feb.) in 1996 and '97. Initial soil test information was collected to determine the influence of the regular fertilizer applications on soil pH and nutritional levels. Applications of Mn reduced take-all infestations from 20% in the untreated plots to 5% in the high rate treatment.

An important finding in this research has been the absence of an increase in levels of Mn in the soil. While this is not surprising on alkaline soils, the pH of the soils in the study were in the 6.5-6.6 range which should allow Mn to be available. It was speculated that the organism that causes take-all patch has been shown to metabolize the Mn in the soil making it unavailable to the plant. Therefore, the scientists concluded that because the take-all organism can render Mn unavailable, sustained control of take-all will require regular Mn applications, as well as a judicious soil testing and pH management program.

*(From: Hill, W.J., J.R. Heckman, B.B. Clarke, and J.A. Murphy. 1999. Take-all patch suppression in creeping bentgrass with manganese and copper. HortScience 34:891-892.)*

# Scanning the Journals

***A review of current journal articles***

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