

TURFGRASS TRENDS

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P A T H O L O G Y

Winter Injury Understanding the Effects and Research Efforts

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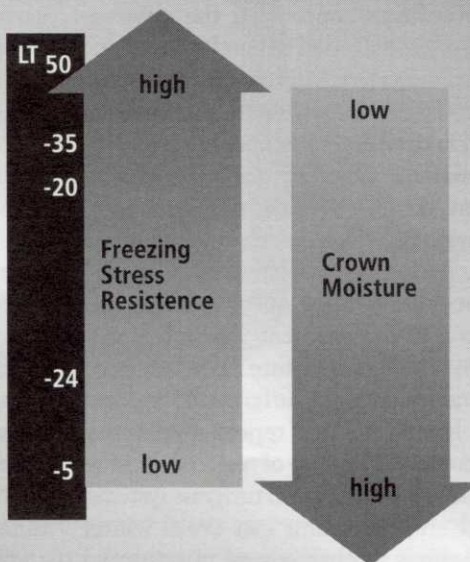
Over the years, golf course management has been impacted by the introduction of various technologies. Technology has enabled the golf course superintendent to maintain higher quality conditions than would be expected if the technology was not available. Does it then follow that technology gives us control?

The answer is different depending on who you ask. Certainly, mechanical and chemical technology have provided tools used to achieve superior putting surfaces. Still, one must wonder how much we can actually control. When it comes to the various aspects of winter injury on our northern golf turf, the last few winters provided the harsh reality of exactly how much we can control — precious little.

Recent devastating losses from winter injury have revitalized interest in this otherwise neglected area, as evidenced by articles in popular trade magazines, conference topics and

COOL-SEASON TURFGRASS RESISTANCE TO FREEZING STRESS

- Rough Bluegrass**
- Creeping Bentgrass**
- Kentucky Bluegrass**
- Canada Bluegrass**
- Colonial Bentgrass**
- Annual Bluegrass**
- Fine-leaf Fescues**
- Tall Fescues**
- Perennial Ryegrass**



Winter hardiness is extremely dependent on the species of turf.

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- Mechanisms of Injury
- Freezing Stress Resistance
- Cold Acclimation
- Maximizing Freezing Stress Tolerance
- Factors That Influence Winter Hardiness
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■ **Winter/Spring Nutrient Use By Cool- and Warm-Season Turf11**

- Annual Growth Cycle of Turfgrass Roots
- Resource Allocation
- Factors Controlling Nutrient Uptake by Roots
- Nutrient Availability
- Impacts on Management

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