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New Light on Freeze Stress

Northern regions of the United States have experienced significant turf loss related to winter injury in the last few years. Historically, widespread winter-kill occurred no more than every eight to ten years. However, it appears to be a more common occurrence now, causing some to reflect on possible causes for the increase.

Many older courses simply have putting greens that are prone to damage due to susceptible grasses and poor drainage. There is growing concern that the lack of light as a result of evergreen tree shade may be exacerbating the problem, yet research is absent.

Over the years, research has focused on a variety of individual aspects of the problem. Studies have investigated ice formation, acclimation and deacclimation from low temperature and winter diseases. Few studies have investigated the role of shade and the effect it could have on acclimation.

To fully understand the role of light on winter-kill, it is vital to understand the complex interactions that occur in the winter. Once we more fully understand the problem, we will be able to effectively address the issue. It's not like we need *another* reason to remove trees!

Freeze Pops

Turfgrass injury from freezing stress is directly related to how, where and whether or not ice forms in cells of the turfgrass stem apex (a.k.a. crown), that region of the grass plant that overwinters. Specifically, if temperatures drop rapidly and water is available for freezing *inside* a plant cell, that cell will die. If several cells in the crown die, the grass plant may not be able to recover. This direct form of freezing injury is thought to be rare, because temperatures generally decline between 1–2° C per hour, allowing the cell time to adapt.

The more common scenario is when ice forms *between* the plant cells. As the ice crystal forms, it will draw water molecules from inside the cell to expand the size of the crystal. As water is drawn from the cell, it becomes dehydrated. Plants utilize various mechanisms to minimize ice crystal formation by holding water inside the cell tighter than the ice crystal can draw it out. The mechanisms of freezing stress resistance lie at the heart of developing strategies for survival.

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This Times

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