FEATURE ARTICLE

Understanding Ice Covers

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Too many turf managers think ice covers are synonymous with dead grass and attribute the cause to the ice directly killing the grass. However, this usually is not the case. Frequently, the loss of turf associated with an ice cover is by direct low temperature kill either (a) during the initial ice formation, or (b) during the thawing period when standing water increases the crown hydration level and then is followed by a rapid drop in temperature typically below 20°F (–7°C).

The winter of 2000–2001 has seen conditions that could result in either the low temperature kill associated with an ice cover as just described, or possibly due to an extended ice coverage itself, especially if a *Poa annua* turf is involved. **The 2000–2001 situation involves an extended accumulation of a wet slush to a depth of 4 inches (100 mm) or more, followed by freezing, and then the accumulation of an additional major snow cover that remains in place.**

Pre-ice Cover Kill. There is a possibility that **the turf has already been killed if the wet slushy condition had resulted in crown hydration, and if this was followed by a rapid drop in temperature to 20°F (–7°C) or lower.** This is especially true if the soil temperature was near or below freezing. A simple way to determine if turf kill may already have occurred is to remove the ice and snow cover from two to four areas that have a history of loss during winter ice-snow occurrences, remove 4 to 6 inch (100–150 m) pieces of turf with the lateral stem, thaw the turf slowly, and placing in a greenhouse or in a warm room near a window to observe whether shoot greenup and growth occurs or if the grass is dead.

Ice Cover Kill. If the turf has not been killed but is encased in ice, the next question is whether the ice cover itself may cause injury. **If the ice cover remains in place for more than 75 days and the underlying turf is dominated by annual bluegrass (*Poa annua*), then the potential for death caused directly by the ice sheet is great.** The actual cause in this case is the toxic accumulation of respiratory gases in and around the grass shoots caused by encasement in the relatively impermeable ice. For other grasses, such as creeping bentgrass (*Agrostis stolonifera*) and Kentucky bluegrass (*Poa pratensis*), research has shown that encasement in ice for up to 150 days at 25°F (–4°C) did not result in injury. Cultural practices that would reduce turf injury caused by extended ice coverage include (a) maintaining a moderately low nitrogen level, and (b) ensuring a high potassium level.

If a substantial ice accumulation occurs beyond the safe time or threshold period, efforts should be made to remove the excess ice and snow down to within 1 inch (25 mm) of the turf surface by powered mechanical means. Once temperatures rise sufficiently after the removal of the excess ice and snow, the application of a black charcoal or fertilizer material at temperatures of ~30°F (–1°C) or higher will aid in absorbing solar radiant energy, thereby resulting in an enhanced rate of ice thaw.

Post-ice Cover Kill. Once the ice-snow thawing process begins it is important to ensure that the water is removed from the turf area as rapidly as possible. There is a scenario in which kill of the turf can occur during this period. This involves the accumulation of water from thawing ice and snow that increases the crown hydration level and that subsequently is followed by a very rapid freeze to 20°F (–7°C) or lower. In many southern-most regions of the snow belt in the northern United States there typically is a thaw period in February during which conditions of this type can exist. Typically this is when much of the turfgrass kill associated with ice covers occurs but it actually is caused by direct low temperature kill.

Predicting Lethal Temperature Threshold. A question frequently asked is "the temperature on our area dropped to 10°F (–12°C). Has the turf been injured?" **Actually anyone who gives a specific threshold temperature at which kill will occur is not knowledgeable in winter injury problems.** The reason is that the actual killing temperature can vary greatly depending on the degree of crown hydration, the rate of freezing, the rate of thawing, and the length of time frozen. Thus, an absolute threshold temperature at which low temperature kill will occur can not be predicted reliably. There also are cultural and environmental conditions that can affect the threshold duration at which ice coverage results in kill of each individual turfgrass species. Unfortunately, the needed research has not been conducted to define these factors clearly. Thus, **if one is considering the removal of an ice sheet, it is better to error on the short side than to wait too long.**