Winter Turf Injury Update for Iowa Golf Courses

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We received several calls in early December 2007 regarding ice injury on putting greens. On the first of December our first snow/sleet/ice storm resulted in various levels of freezing cover over Iowa. On 11 December we received another dose of ice in the south and snow in the north. Depending on the location you may have any combination of 0 to 1.5 inches of ice and from 0-8 inches of snow. Here are some answers to your questions regarding what to do about ice on your putting greens.

Should I remove the ice? At this time my answer is a resounding no. Ice looks scary but from what I have observed the ice cover (actually ice encasement) that occurred in early December is actually providing a protective layer of insulation over the turf; its acting like a synthetic winter cover that you would buy and place on the green to prevent winter desiccation. That's a big Merry Christmas from Mother Nature. Had we received no ice and only snow, then most of you would consider the snow as a benefit or free insulation for the green. At this time the ice is providing the same type of protection you would be getting from snow cover. You can collect samples as instructed below to see if any injury has occurred so far. I don't anticipate that much injury has occurred by mid-December. In the unlikely event that the ice caused injury then there is nothing you can do about it now and removing the existing ice will remove the insulation and only further expose the remaining turf to a sudden drop in temperature.

Your winter trial indicated that annual bluegrass was more sensitive to low temperature and ice injury compared to creeping bentgrass. **My greens are over 50% annual bluegrass… should I be worried?** Whether its summer or winter **we always worry about annual bluegrass dying** and yes, annual bluegrass is more susceptible to the various forms of winter injury than bentgrass. Renovating the greens to eliminate annual bluegrass and establish creeping bentgrass goes a long way towards reducing the risk of winter injury on putting greens. Winter desiccation is the only type of winter injury that concerns me on creeping bentgrass and with the current level of ice and snow protecting the green there is virtually no risk from winter desiccation at this time for either bentgrass or annual bluegrass. It is doubtful that direct low temperature has killed the plants (unless they didn't harden off properly) since temperatures have not reached the critical low of -4 to 14 ºF for annual bluegrass. Bentgrass can tolerate temperatures as low as -40ºF.

When should we remove the ice? Ice removal in Iowa is seldom recommended since ice cover generally does not remain long enough to develop anoxic conditions; a continuous sealing of the surface with ice that traps plant toxic gases, depletes oxygen, and may result in turf injury or death. The critical duration for ice cover varies between 30 and 120 days with 60 days generally thought to be the target duration when anoxic conditions could begin to cause significant turf injury. Freezing and thawing conditions

in Iowa often make it difficult to maintain a continuously sealed surface for more than 60 days. In the 12 years I have been evaluating winter injury in Iowa I have never had a confirmed report of turf loss by anoxia. Anoxia can be detected by the rotten egg smell of anaerobic conditions that escapes when ice is removed. Soil organisms continue to respire under the ice causing a build up of carbon dioxide and other gases and a depletion of oxygen. This problem does not happen immediately after the ice is formed, but instead it slowly accumulates over time. Some research suggests that sand-based greens with less organic matter and lower soil microorganism activity are less prone to anoxic conditions than native soils with higher organic matter and more microorganisms. **It is highly unlikely that harmful gaseous buildup will occur before mid-January. So take a chill pill and relax for the next 30 days; the ice could be gone by then.** Some researchers have measured gaseous exchange under ice cover but unfortunately there is no simple device that can be used on the golf course. Air venting systems under ice and impermeable covers have been shown to reduce turf loss by anoxia.

What should I do about our frequent loss of turf during the winter where standing water freezes? I do see this almost every year on a limited basis and I consider these to be special cases of non-hardy turf that also receives a dose of ice on a regular basis. Poorly drained areas are under stress most of the year because the excess water limits root growth, produces anaerobic conditions, and prevents turf from carbohydrate accumulation and proper winter hardening. **I would spend my effort on the more permanent solution of drainage installation** in these areas rather than the temporary approach of chipping ice or reseeding each year.

How do I know if my green has been injured? Anytime during the winter you can pull samples from areas where you suspect winter injury to occur. For winter desiccation collect samples from wind blown mounds. Low areas that collect water and eventually form ice should also be sampled. If the ground is frozen or covered with ice use a sawsall followed by a hammer and chisel to extract about a 4-inch sample with about an inch of attached soil. Put the frozen samples in the refrigerator for a day until they completely thaw and then allow them to recover at room temperature in the light on a windowsill. **As mentioned earlier I would wait until mid-January before worrying about ice buildup. More importantly, when the ice begins to melt be certain that the water can quickly drain away from the surface and does not refreeze.** Water often catches at the front of greens where the higher cut collar acts as a dam. Shovels can be used to open drainage channels through the slush and ice. Water does not move through frozen soil so subsurface drainage is ineffective.

Should I be using heat-gathering products such as milorganite, dark topdressing, or crumb rubber to melt the ice? Since I am not recommending ice removal at this time **I don't see the need for these products now**, but if you use them then be sure the water can drain from the green as the ice melts. If it becomes necessary to remove ice then these products will soften the ice making mechanical removal easier.

Our greens are covered; will that stop injury from ice? That depends on the type of winter protection cover. Covers generally provide an added level of protection against

winter injury. Permeable covers have been used for several years to reduce winter desiccation, limit winter traffic, increase temperature, and increase spring green-up. Because they are porous they only partially reduce the contact between ice and plant tissue. More recently impermeable covers have been used to keep the grass surface drier and reduce formation of ice around the plant. An insulating layer of foam or "bubble wrap" placed beneath the impermeable cover has reduced winter injury under the cover. The impermeable covers coupled with an insulation layer keep ice from contacting the grass surface and have shown promise as an effective winter protection system. The potential for anoxic conditions under impermeable covers is still being evaluated.

Where can I get more information? The Northeast Winter Injury Initiative http://www.umassturf.org/winterinjury/cooperators.html is a collection of university researchers, USGA representatives, and golf course superintendents that have recently combined to deal with winter injury issues. We can develop a network of interested participants and states to tackle this problem in our Midwest Region. **Contact Dave Minner (dminner@iastate.edu) or Jeff Wendel (jeff@iowaturfgrass.org) if you would like to share your winter injury experience and get an information exchange started.** The Iowa GCSA/GCSAA sponsored research report on Winter Injury of Putting Greens can be found at http://www.iowaturfgrass.org/research/wordformat/winterinjuryjan2006.doc