FEATURE ARTICLE

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Spring-like Conditions in Late February Spell Trouble for Chicagoland

For the many courses that did not treat for pink and gray snow mold last fall simply because they lack a consistent history with the diseases, considerable expense will be required this spring for curative treatments.

One of the hottest topics in the game of golf is the so-called spring-like effect of the new generation of nonconforming metal drivers. It is said that in the hands of the right golfer, these clubs can add more than 10 yards of distance to the tee shot, thus giving its owners an unfair advantage. While the issue of exploiting 21st-century technology to improve one's score, as opposed to spending time on the practice tee with the golf professional, is important, it is not the spring-like effect that is currently on the minds of many superintendents in the Chicagoland area.

Snow mold, crown hydration, desiccation—Mother Nature has left area superintendents a veritable grab-bag of plagues with which to contend.

The spring-like effect of concern to superintendents in Chicago is the lingering consequence of the fluctuating weather conditions in late February on greens, tees and fairways. As of the writing of this article in early March, a short stretch of spring-like weather had already revealed quite a bit of winter damage on fairways that were not treated for snow mold activity due to the rarity of the problem. Specifically, warm temperatures melted away the heavy accumulation of snow and in the process revealed acres of turf damaged by both pink *(Microdochium navale)* and gray *(Typhula spp.)* snow mold.

The genesis of this year's severe snow mold outbreak can be traced back to December when a heavy blanket of white insulation was laid down over the ground in the form of snow. Such early snowfall is the perfect

incubator for snow mold as it keeps the temperature of the soil/surface interface at about 40° F. At this temperature, the fungi can readily infect and colonize the semidormant foliage of creeping bentgrass and annual bluegrass, a.k.a. *Poa annua*. In their semidormant state, these turf species have no active defenses to ward off snow molds nor can they recover from infection via new growth.

While snow molds are most often associated with snow cover because its provides the perfect microenvironment for their growth and development, it is not an actual requirement for them to wreak havoc on golf courses. With this in mind, the proliferation (especially of pink snow mold) will likely continue well into early spring or as long as the temperature hovers between 32° F and 45° F and there is ample free moisture. This simply means that, for the many courses that did not treat on a preventive basis last fall because they lack a consistent history with snow molds, considerable expense will be required this spring for curative treatments.

In addition to revealing snow mold activity, the spring-like fluctuations in temperature during late February will, if followed by freezing temperatures in either March or early April (a highly probable event according to the long-range forecast), cause many courses to suffer from crown hydration. This form of winterkill is by far the most destructive because little can be done in terms of prevention. For example, ice cover that produces a toxic build-up of respiratory gases (CO_2) can be broken up and removed during early spring to minimize turf losses. Equally, areas of the course that are exposed to drying winter winds can be covered or irrigated periodically with a water wagon to prevent desiccation. Unfortunately, when it comes to crown hydration damage, sometimes wishful thinking is the first and only line of defense.

The name crown hydration is somewhat of a misnomer for a phenomenon whose lethal outcome is actually due more to dehydration. In the process of freezing, ice crystals form outside the hydrated cells of crown tissue and as they expand, the growing crystals extract moisture from within the cell. The resulting loss of moisture causes dehydration and a contraction of the cell. Upon thawing, the crown cells will die off if they cannot reabsorb enough water to regain full turgor.

The mechanics behind crown hydration have yet to be completely unraveled; however, it is a problem most often associated with turf growing in wet soil conditions. The damage occurs when crown tissue (no longer dormant because of spring-like weather conditions in late winter) fails to survive repeated freeze/thaw cycles during early spring. In Chicago, the critical time frame for crown hydration development is late March as the turf begins to lose its winter hardiness and semifrozen soils, along with fluctuating temperatures, allow standing water to persist and refreeze.

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Early identification of turf that has been damaged by crown hydration requires removing a plug from suspect areas and placing it in a warm, sunny location.

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The reason for this action is that cool-season turf retains a certain amount of green color during winter dormancy and it is not until the crown tissue has been sufficiently warmed in the spring that chlorophyll in damaged cells degrades and turns brown. Because of this fact, many courses will not know the full extent of crown hydration damage until the turf begins to truly green up in late March or early April.

Courses that are especially vulnerable to crown hydration have a few characteristics in common. First, they have bowl-shaped greens constructed with poorly draining soil that holds surface water during the winter months. This is not to say that newer, sand greens are immune to crown hydration, as underlying drainpipe can easily freeze during the winter and prevent water from escaping.

Second, vulnerable courses have a substantial population of *Poa annua* as opposed to creeping bentgrass (no doubt due to shade and poor drainage, both of which discourage creeping bentgrass). In a controlled study by Dr. J. M. Roberts at the University of New Hampshire, complete kill of *Poa annua* was achieved with three alternating freeze/thaw cycles in which the soil temperature was dropped to 20° F. These same environmental conditions produced only a 5 to 30% injury of creeping bentgrass. The difference in mortality between the two species has yet to be determined; however, the differing characteristics of the plasma membrane surrounding the crown tissue cells is thought to play a central role during freeze/thaw cycles.

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Even newer, sand greens can suffer from the ravages of crown hydration when the importance of full sunlight exposure and good surface drainage are ignored during construction. In this case, shady growing conditions prevented the turf from hardening-off in the fall and the underlying drainpipe froze during the winter, thus trapping standing water on the surface.

When greens are damaged by winterkill, be it crown hydration, prolonged ice cover or desiccation, promoting recovery is a must for everyone involved. Both superintendents and golfers have an obvious interest in the course and therefore need to work cooperatively to ensure the swiftest possible healing. One of the best places to start is by establishing an open line of communication between all parties so that everyone is kept up-to-date on the ongoing progress.

Once the news of the situation has been properly disseminated, incorporating the following 10 steps into the recovery plan should yield optimal results:

1. Avoid sodding damaged areas, if at all possible. Note: While many often believe that sod for a putting green is heaven-sent, it can require months of light topdressing applications before the surface trueness is restored. Further, if the sod is not harvested from an onsite nursery with identical physical characteristics to the damaged green, a semipermanent scar will be created for all to see during the next couple of years.

2. Close the most heavily damaged greens **immediately**. Note: The benefit of this action may seem inconsequential at first, but come late spring there will be little doubt that closed greens recover much faster than those that remain open to play.

3. Start seeding damaged areas as early as possible. Note: While some may argue that the soil and air are too cold to promote fast germination, the fact remains that the sooner a damaged area is seeded, the sooner it recovers.

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4. Use either an aerator or mechanical seeder to establish good seed-to-soil contact. Note: The choice between these two pieces of equipment has much to do with personal preference, although aerators tend to work better on greens that remain open because the deeper depression made in the putting surface provides security for the emerging seedlings.

5. Avoid the temptation to seed at a rate greater than 2 lb./1,000 ft². Note: Using excessive seeding rates to quickly regenerate damaged areas often creates overcrowding of seedlings in aeration holes or seeder furrows that in the long run actually delays full recovery.

6. Warm the soil with covers to encourage seed germination. Note: Some superintendents have produced excellent results with a sheet of clear plastic perforated with an aerator for ventilation. As the temperature can rise quickly under a plastic sheet, it is important to remove it during warmer midday temperatures.

7. Prevent decaying foliage from forming an impervious crust over the soil. Note: Many superintendents have had good success breaking up crust formations by spiking damaged areas at least once each week.

8. Mow with a sharp walk-behind mower equipped with either a solid or sectional roller. Note: While triplex mowers are arguably more efficient, the added wheel traffic and inability to easily maneuver around damaged areas are a great disadvantage when recovering from winterkill.

9. Apply light applications of a liquid fertilizer every seven to ten days until recovery is complete.

10. Syringe, syringe, syringe . . .

By U.S. Open weekend (or, for you nongolfing types, Father's Day weekend), the spring-like effect of late February will hopefully be a forgotten experience. Areas of the course damaged by either snow mold or crown hydration should be almost fully recovered. Of course, the debate over the spring-like effect of the new generation of metal drivers will probably still be raging on. Maybe someone should write about a 10-step recovery for golfers addicted to distance.

References

Beard, J. B.
Turfgrass: Science and Culture.
Prentice-Hall, Inc.,
Englewood, N. J. 1973.

Roberts, J. M.
"Understanding crown hydration damage."
Golf Course Management.
October 1993, pp. 48-54.

Snow, J. T.
"Promoting Recovery from Winter Damage."
USGA Green Section Record.
Jan./Feb. 1979, pp. 11-13.

Wilkinson, H. T.
Interactive Turf: Cool Season Turf Diseases and Their Management.
University of Illinois. 1998.

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