Winter Injury: The Road to Recovery

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Turf on putting greens often dies, sometimes for indiscernible reasons, during winter. Known causes include snow mold disease, low temperature kill, desiccation from wind, and lack of oxygen or the effect of noxious gases related to ice cover. Creeping bentgrass is usually much more resistant, but not immune, to winter injury than annual bluegrass (Poa annua L.). The end result are putting greens that may have sparse living turf, dead patches, or large areas of killed turf.

The big question coming out of winter is "What to do about getting the greens to a playable condition before the golfers arrive"? Putting up a "Closed for Renovation" sign generally isn't an acceptable option! The answer depends on the extent of the damage and, to a lesser degree, the amount of time available to recover.

Thin turf may be able to recover on its own, particularly if it's creeping bentgrass. As spring conditions develop, the warmer temperatures and rush of water into the turf plants will propel new tiller development and leaf expansion. Addition of a little water-soluble nitrogen fertilizer will help, typically 0.3 to 0.5 lb N/1000 ft^2. Granular N additions work just fine, though they should be watered in. Research at Michigan State University showed 0.3 lb N/1000 ft^2 applied as a granular treatment at 21 day intervals resulted in better turf cover than 0.1 lb N/1000 ft^2 applied at weekly intervals following spring seeding of creeping bentgrass into dead turf (Dr. Kevin Frank, personal communication, Feb. 2011). Mowing will generally help too; it will certainly help with spring greenup. Mowing helps by removing any dead leaf tips which increases the amount of sunlight available to penetrate the turf canopy and heat the soil. The higher soil temperatures will stimulate growth. Mowing also may encourage growth by stimulating the turfgrass plants' production of hormones for more tiller production, cell division and enlargement. Irrigation will help grass grow, too, particularly on well-drained soils if rainfall is lacking. Light topdressings can also aid establishment.

Small dead patches may be dealt with in several ways. Plugging out dead turf and replacing with live turf from a nursery is time consuming and laborious but offers a virtually sure type of recovery. Verticutting may encourage stolon development of surrounding bentgrass plants into the dead patch, though stolons can also develop without verticutting. Unfortunately, stolon development will take several weeks and the patch will only slowly fill in as new plants develop from the stolons. Raking out some or all of the dead turf and reseeding can more rapidly fill-in dead patches than waiting for stolon development.

Large areas of dead turf warrant a moment of truth. If the area habitually dies out, or clearly died out due to something like crown hydration caused by poor drainage, it may be worthwhile to take corrective actions such as reshaping the green or improving the drainage.

Regrassing large areas can be done several ways. I've seen some courses use multiple plugs, which can definitely help, but will require many weeks before the areas in between the plugs fill in. Any areas not quickly covered by bentgrass are likely to be populated by annual bluegrass as existing seed in the soil germinates. Consequently, sodding or seeding bentgrass are often better options.

Sodding offers a quick, almost sure success of getting complete bentgrass cover on the green. Using sod to fix large patches is a laborious and often costly process. The existing dead turf has to be removed, and the soil base brought to grade sufficiently so that the sod is level with the surrounding turf. Sod selection can be important to the success of the project. In most cases, sod grown on soil with a finer texture than the soil of the putting green will hold water at the surface, inhibiting rooting and predisposing the sodded area to future types of water-related stresses such as root rot diseases. One study clearly documented the reduced infiltration rate associated with sodding putting greens compared to seeding (Table 1). Other factors to consider are the difficulties in getting the color and density of the turf to match the rest of the turf on the green, especially as creeping bentgrass sod availability is quite limited. Finally, since bentgrass sod is typically maintained at 0.5 inch or greater height, it will take some effort and time to bring the height down to putting green conditions.

Seeding offers a broader selection of cultivars than one is likely to find with sod. Any seed used should of course be certified seed to protect against the introduction of unwanted species such as annual bluegrass and to ensure good seed germination. Cultivar information can be found at the National Turfgrass Evaluation Program (NTEP) website, www.ntep.org. The information provided will allow purchasers to select seed on the basis of color, spring greenup, and other characteristics including quality.

Creeping bentgrass can take 7-14 days to germinate depending on temperature. Establishment can be sped up by using pre-germinated seed. The process is relatively simple. Soak a water-permeable bag of seed in a large container of room temperature water. Occasionally stir the water during the day, or place an aquarium bubbler in the container. The stirring or bubbling is important to circulate oxygen dissolved in the water into the seed bag. The water should be replaced with new room temperature water at the end of the day to remove possible seed germination inhibitors flushed out by the soaking process. After two to three days, spread the seed on a paved or other flat surface, and keep warm (at least room temperature). Keep the seed moist by occasionally misting it. I like spreading it on tar paper to help keep the seed from drying out too fast between mistings. Examine the seed at least twice daily for signs of germination. Within two to three days, seeds should begin to produce roots. As soon as the first root is seen, the seed is ready for planting. It can be mixed with sand or Milorganite®, then distributed using a drop or rotary spreader or a slit-seeder. It is important to plant the seed before too many seeds begin to germinate, as the seed will be unable to form a plant if the root gets broken off before planting.

If the seed is broadcast, be sure to prepare the site first to allow good seed to soil contact. This may mean raking off or even sod-cutting the dead turf from the area. Extensive core aeration, usually before seeding, can also be effective. Irrigate the site after seeding just as any seeding event.

Mowing and fertilizing can take place almost immediately after seeding. Keeping traffic off the green while its establishing may be the toughest part of all. Ideally, the greens will be allowed at least one month before play begins.

Table 1. Impact of sodding on infiltration rates of putting greens (adapted from Canaway, 1993).

Method	Ball Roll (ft)	Infiltration Rate (in/hr)
Seeded	5.64	7.0
Juvenile Sod	5.84	4.1
Sod, Sand-Based	5.18	1.1
Sod, Soil-Based	5.02	1.8
Sod Washed	5.25	2.8
$LSD_{.05}$	0.36	0.4

References Cited:

Canaway, P.M. 1993. Effects of using seed, sod and juvenile sod for the establishment of an all-sand golf green turf and on its initial performance under wear. In Int. Turfgrass Res. Soc. J., R.N. Carrow, N.E. Christians, R.C. Shearman (eds.). pp. 469-475. Intertec Publishing Corp., Overland Park, KS.