

Bermudagrass Management to Reduce Winter Injury — Pay Now or Pay Later

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WINTER INJURY is the most limiting factor in using bermudagrass on golf courses from the mid-South up into areas of its northernmost adaptation (the transition zone). It is not a problem every year, nor is it a problem that affects all bermudagrass turf to the same extent. Many of the areas covered in this article involve strategies or practices that need to be developed during the growing season to prepare the turf against winter injury.

To deal effectively with winter injury, one must first realize that the term is a catch-all phrase that can include a number of factors that act alone or in combination to injure dormant bermudagrass. While injury to actively growing turf is readily discernible and its cause relatively easy to determine and correct before the damage becomes severe, injury to dormant bermudagrass only becomes apparent in late spring, at the time bermudagrass turf begins to break dormancy and regrow. In years of significant injury, the golf course superintendent is left with the decision of whether to: 1) encourage the remaining bermudagrass to spread into damaged areas; 2) repair the area by sprigging, sodding, or plugging; or 3) try to maintain the overseeded grasses.

To maximize the winter hardiness of any bermudagrass turf, the golf course superintendent is faced with factors that he can control and factors he cannot. Controllable factors, those that allow the golf course superintendent to have a positive influence on bermudagrass winter survival are cultivar selection, traffic, the use and timing of cultural practices, and the ability to repair or reestablish damaged areas. Those factors that the golf course superintendent has traditionally been unable to control are low temperature, the length of dormancy, and moisture availability over the winter.

Temperature

For a dormant bermudagrass turf to survive the winter, the reproductive

plant parts (crowns, stolon buds, and rhizome buds) present at the end of the growing season must survive the dormant period. Exposure to low temperatures is the primary concern of winter injury, since it is the most limiting factor in the use of bermudagrass in the United States. Most recently the winter of 1976-1977 exemplified the magnitude of cold temperature injury in the Southeast. Not only were temperatures greatly below normal, but they lasted a long time as well.

It is difficult to control winter temperatures unless one is fortunate enough to have a good snow cover or is willing to use natural topdressing like straw or synthetic covers on bermudagrass to protect the viable plant parts. From a cost standpoint, use of covers appears most feasible, especially on greens and tees and possibly in other isolated problem areas, like low spots and north-facing slopes that don't receive much winter sunlight. On areas that cannot be covered, one does not want to do anything that might make the bermudagrass more susceptible to injury. For example, late fall vertical mowing or aerification, extremely short mowing heights going into winter, or excessive traffic can contribute to the loss of soil moisture and to low-temperature exposure.

Consideration should also be given to the age and condition of the turf in relation to its susceptibility to low-temperature injury. A bermudagrass turf entering its first winter after being sprigged or seeded will have very little if any rhizome development. Therefore, the crown and stolon buds must survive the winter for the turf to survive. By being located at the soil surface (crowns) and above (stolons), these plant parts are more vulnerable to low-temperature injury and desiccation.

A young turf has yet to build up an acceptable thatch layer as well and will not be as wear-tolerant or able to resist cold temperatures as well as a mature sod. This is why it is so important to treat a newly sprigged or seeded turf with extra care to get it through its first

winter. Included in this would be to establish the area early in the growing season to allow the turf to reach its maximum development before winter. With more extensive rhizome formation in the second year, the turf will gain another parameter in winter survival. Since rhizome buds are beneath the soil surface and are more protected against low temperatures, a turf that is severely injured above ground can eventually recover due to regrowth from rhizome buds.

Winter survival can be periodically checked throughout the winter by removing sod plugs and bringing them inside to warm and regrow. In this way, one could be certain of what to expect in spring and to plan accordingly.

Cultivar Selection

Not all bermudagrass cultivars are equal in their inherent ability to survive low temperatures. Therefore, the best long-term insurance for bermudagrass survival is to select cultivars that have a track record of surviving damaging winters based upon their genetic cold tolerance.

Current observations of the bermudagrass cultivars used most commonly in the transition zone of the United States indicate the winter cold hardiness from most cold hardy to least cold hardy to be as follows: Midiron (P-16) > Vamont > Tufcote > Tifway (419), Tifway II > Common, Tifgreen. Of these bermudagrasses, only common bermudagrass can be seeded; the others have to be established vegetatively by sprigs, plugs, or sod.

Growing vs. Dormant Seasons

Management of any bermudagrass cultivar can also depend on the length of the growing season and/or dormant period. In the Southeast, bermudagrass is managed under growing seasons ranging from six to nine months. The shorter and cooler the growing season, the more difficult it becomes for bermudagrass to grow enough under normal management regimes to persist as fine turf.

Conversely, shorter growing seasons translate into longer dormant periods. Even though a bermudagrass plant is dormant, it is respiring and using up stored food reserves. The stored food reserves that remain at the end of the dormant period are used to initiate new roots and shoots. Abnormally cool spring temperatures or excessive competition from winter weeds (annual bluegrass, chickweed, parsley-piert, speedwell) or overseeded grasses can inadvertently act to lengthen the dormant period, causing the plant to further deplete stored food reserves and weaken its spring regrowth potential.

Traffic Control

To prevent extensive damage, human and vehicular traffic control is essential during the dormant period. It is most important in areas of concentrated trampling (greens and tees) and holds true for bermudagrass areas whether overseeded or not. Strict adherence to cart paths with a 90° rule for crossing fairways, use of winter tees, and frequent cup changing can help reduce traffic related damage.

Overseeding

Overseeding bermudagrass turf with perennial ryegrass also delays bermudagrass growth in the spring. This holding back of bermudagrass is most severe in a cool, moist spring in overseeding the improved types of perennial ryegrasses. These newer perennial ryegrasses are persisting with increased vigor in late spring and early summer, which interferes with bermudagrass growth by competing for light, nutrients, and water. This further shortens the period when bermudagrass can grow, thus weakening the stand. This is usually more of a problem in the upper South and when a newly sprigged stand of bermudagrass is overseeded the first fall after it is established.

The alternative is to go to lighter overseeding rates on tees and fairways or not overseed at all. Some superintendents have overseeded fairways with annual ryegrass to reduce spring competition but then found it objectionable in appearance and in the increased mowing requirements during the dormant period.

Herbicides

Delays in spring growth have also been attributed to application of preemergence herbicides and dormant applica-



(Above) Bermudagrass survival can be checked by breaking open a plug to examine rhizome appearance. (Below) Viable rhizomes will usually be flesh colored and snap in two, revealing a whitish-colored center.



tion of broadleaf herbicides. However, such effects vary with year, herbicide, and bermudagrass variety. Such induced delays in regrowth puts another stress on bermudagrass during the spring transition period.

Some superintendents recognize this and have shifted from preemergence herbicides to postemergence herbicides for summer annual grass control in early spring. In such a program, the preemergence herbicide application is targeted to the period of goosegrass germination, which is traditionally four to eight weeks later than crabgrass germination and after dormancy break. Until that time, any crabgrass that germinates can be easily controlled with postemergence materials. The net result is the removal of one possible stress to the bermudagrass plant while at the same time encouraging more of a stress to the overseeded grasses, which can speed the spring transition.

Disease

Spring dead spot is recognized as a winter-related problem of bermudagrass and appears limited to areas of the South that regularly experience freezing temperatures. As such, spring dead spot is not a problem in Florida or the southern parts of the Gulf Coast.

Excessive thatch appears to favor development. Areas having a history of spring dead spot experience more severe spring damage following excessive late summer and early fall nitrogen fertilization. It is not clear whether the disease acts directly in damaging bermudagrass or acts to predispose the turf to low-temperature injury.

Reducing the effect of spring dead spot involves managing the turf for maximum winter hardiness and the use of more resistant cultivars. Control has been obtained with fall applications of some fungicides. However, no fungicides are yet labeled for spring dead spot control.

Fertility

Bermudagrass fertilization practices should be structured to encourage bermudagrass growth without predisposing the turf to winter injury. Where maximum growth is desired, nitrogen fertilizers that have a large part of their nitrogen in a readily available form are preferred over slow release materials. This is especially important where the growing season is short or the turf needs to recover from winter injury.

Excessive top growth stimulation from high amounts of nitrogen in late summer to early fall should be avoided, because it could reduce winter hardiness. Application of potassium has long been recognized as beneficial in maximizing bermudagrass winter hardiness. Maintenance of high levels of potassium fertilization throughout the growing season should be a standard practice where winter injury is a concern.

Soil Compaction and Drainage

In addition to surface wear, soil compaction is a by-product of excessive traffic. Compacted soils have a greater potential for heat exchange, and as a result they cool faster than noncompacted soils. This translates into greater potential for low-temperature injury. In a similar way, poorly drained areas or low spots

where water tends to settle are also more susceptible to winter injury. This is related to high tissue water content at the time of exposure to cold temperature, resulting in direct kill of viable plant parts from excessive freeze damage.

Traffic control, a strong aeration program, and adequate surface and internal drainage will reduce low-temperature stress as well as enhance bermudagrass vigor during the growing season.

Thatch and Mowing

Thatch control is important to prevent the elevation of crowns and rhizome buds into an excessive thatch layer. If this occurs, these plant parts become more removed from the soil's buffering capacity against desiccating conditions, rapid temperature fluctuations, and low-temperature exposure. A sound thatch control program, whether it is curative (vertical mowing) or preventive (topdressing, lower nitrogen rates, frequent aeration with return of cores, use of hydrated lime, etc.), besides improving bermudagrass resistance to winter injury, will greatly enhance establishment of a fall overseeding of cool-season grasses.

While vertical mowers are commonly used on greens and tees, very few golf courses have made the commitment to purchase equipment specifically designed to vertical-mow fairways. However, if thatch is a problem, vertical mowing fairways yearly should become a part of the management program.

A common practice in the transition zone and the upper South, going into mid to late fall, is to raise the mowing heights of bermudagrass fairways, tees and greens so that the added leaf tissue helps insulate the viable plant parts and give more resistance to traffic during the dormant period.

Repair and Reestablishment

Should winter injury occur, repair or reestablishment should be done as early in the growing season as possible in order to allow the turf to become well established before winter. Maintenance of a bermudagrass nursery can greatly facilitate the repair process.

There is no guarantee that bermudagrasses will survive a winter period. However, a well-structured bermudagrass management program can make a difference in bermudagrass survival, which in turn makes for quality bermudagrass playing surfaces during the growing season.

The first sign of spring! Bermudagrass breaking dormancy.

