



Low Temperature Damage to Turf¹

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Injury to warm-season turfgrasses often occurs when temperatures drop below 20°F (-6.7°C). In general, major winter injury to turfgrass is caused by the following: 1) tissue desiccation, 2) direct low temperature kill, 3) diseases, and 4) traffic effects. For example, damage from the 1989-90 freeze can probably be attributed to poor cultural practices which weakened turf and made it more susceptible to injury or death from low temperatures. Subsequent damage may also have resulted from effects of traffic on frozen turf.

Reasons for Temperature Damage

Most warm-season grasses have very poor cold tolerance ratings when compared to cool-season grasses. Due to lower fall temperatures and reduced daylengths, warm-season grasses enter a state of dormancy, evidenced by brown, dead shoot tissue, which is maintained throughout the winter in north Florida. In central Florida, a growth and metabolism reduction, rather than an actual dormancy, may be seen. This death of shoot tissue or lack of growth does not generally indicate that the grass is not going to recover; instead, this is a natural state and provides protection for the grass when faced with cold temperatures. In cases of severe freezing temperatures, some grasses may suffer irreversible damage, and use of these grasses should be limited to

warmer climates. For instance, St. Augustinegrass, which generally exhibits poor cold tolerance, is not used as extensively in north Florida as other grasses, and is used less as you progress into northern Georgia.

Cultural factors that tend to promote cold injury include: poor drainage (soil compaction), excessive thatch, reduced lighting, excessive fall nitrogen fertilization, and a close mowing height. The weather pattern preceding a severe and sudden cold wave also influences a turf's low temperature tolerance. In general, if turf has had several frosts prior to a drastic temperature drop, it has been better 'conditioned' to survive. The 1989-90 cold snap in much of north and central Florida was preceded by three to five frosts. These helped increase carbohydrates and proteins in plants that enabled crown tissue to withstand cold temperatures without severe membrane disruption. The freezes that occurred in the early 1980s did not have these preconditioning periods, resulting in severe damage. In this case, grasses were still green, and protective crown tissue was succulent and therefore susceptible to cold temperatures.

Shaded areas may suffer more intense cold damage. Shade (low light intensity) prevents normal daytime soil warming; therefore, these areas stay colder for longer periods of time, and more low

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temperature damage may occur. Shade also reduces the plant's ability to produce carbohydrates needed for increased cold tolerance.

Traffic (foot or vehicular) may further increase injury to cold damaged turf. Traffic should not be allowed on frozen turf until the soil and plants have completely thawed. Syringing the area lightly prior to allowing traffic on it will help reduce frozen turf injury associated with traffic.

Assessing the Extent of Injury

Symptoms of direct low temperature damage includes leaves that initially appear wilted. They may subsequently take on a water-soaked look, turning whitish brown and then progressing to a dark brown. Damaged leaves are not turgid and tend to mat over the soil, often emitting a distinct putrid odor. Areas hardest hit are usually poorly drained ones such as soil depressions. If you suspect your grass has experienced cold damage, take several 4 to 5 inch diameter plugs from suspected areas and place them in a warm area for regrowth. A greenhouse or warm windowsill should suffice. Observe these for 30 days or until growth resumes. If good regrowth occurs, then little damage is assumed. If regrowth is absent or sporadic, then some degree of damage was sustained.

Selection of Cold-Hardy Grasses

Within the warm-season grasses, the most cold-hardy species is zoysiagrass, followed in descending order by bermudagrass, bahiagrass, centipedegrass, seashore paspalum, carpetgrass, and St. Augustinegrass. Within these species, there are different degrees of cold tolerance between cultivars. For instance, centipedegrass cultivars 'Oklawn,' 'Tifblair,' and especially 'TennTurf' have good cold tolerance. In St. Augustinegrasses, 'Raleigh,' 'Bitterblue,' 'Seville,' and 'Jade' generally exhibit the best cold tolerance, while 'Floratam,' 'Floralawn,' and 'Floratine' are more susceptible to cold temperatures.

Management Practices to Minimize Cold Damage

Regardless of turfgrass species selected, the following management practices can help minimize cold temperature damage.

Recently planted (sprigged, sodded, or seeded) grasses can expect to be more severely damaged by cold. Because roots are less developed and shoot tissue more tender, overall stress tolerance is reduced in just-planted grasses. To minimize cold damage, particularly in north Florida, delay fall planting of grasses until spring or early summer. In south Florida, grasses may be planted year-round, but care should be taken to protect immature turf from occasional cold temperatures.

Fertility can also influence cold tolerance. Late season (late September in north Florida, after mid October in the central and southern regions) application of nitrogen will promote shoot growth in the fall, when the grass growth and metabolism are slowing down. Fall shoot growth will deplete carbohydrate reserves, which help the grass regrow from any stress, and tender shoots are less able to tolerate adverse conditions such as cold. Therefore, late-season application of nitrogen is not recommended.

Potassium fertility in the fall has been shown to enhance cold tolerance and promote earlier spring greenup of grass. Application of potassium at the rate of 1/2 to 1 lb. per 1000 square feet is recommended for the last fertilization of the year.

Effects of shade can increase cold damage. Because shaded areas do not become as warm as areas in full sun, injury in these areas may be more severe. Compacted soils also remain cooler than well-drained areas, which increases the probability of cold temperature damage. See Environmental Horticulture and Soil and Water Science Department factsheets for more information on relieving soil compaction.

Increasing mowing height can reduce cold injury in a number of ways. First, it will promote deeper rooting, which is one factor always associated with greater stress tolerance. It will also allow for production and storage of more carbohydrates late in

the summer. In addition, higher mowing heights can create a warmer micro-environment due to extra canopy cover provided by longer leaf tissue.

Because cold damage may initially resemble drought stress, people sometimes feel that additional water may be needed. Overall, correct irrigation practices can alleviate many stresses faced by turf, but as the grass goes into dormancy, water needs are reduced.

Spring Greenup

Unless your turfgrass has been subjected to unusually cold or freezing temperatures for long periods, or your management practices have augmented the effects of the temperatures, your grass should begin to green up as temperatures and day lengths increase in the spring. At this time, recommended fertility, irrigation, and mowing practices should be resumed for the best health of your lawn all season.