

"If the thermometer had been an inch longer, we would have frozen to death."

— Mark Twain

Fall triggers a number of changes in plant growth, most notably the appearance of "fall color" among various deciduous tree species. The degradation of chlorophyll in the leaf allows for the expression of other leaf pigments.

Warm-season turfgrasses, too, can undergo a color change. However, this change is associated with a plant stress known as chilling.

Chilling injury is defined as low-temperature stress in the absence of freezing that readily occurs on warm-season grasses when temperatures drop below 54 degrees Fahrenheit (12 Celsius) in the fall. Although chilling is most often associated with bermudagrass, it occurs on most warm-season turfgrasses. If you're not aware of the environmental conditions present and recognize the symptoms, chilling injury can be rather striking and disconcerting, but more importantly misdiagnosed.

In addition to cool temperatures, sunlight is essential for injury and leaf bleaching to occur. Chilling injury causes several metabolic or physiological dysfunctions to the plant, including: 1.) disruption of the conversion of starch to sugars (amylolytic activity); 2.) decreased carbon dioxide exchange; 3.) reduction in net photosynthesis; and 4.) the destruction/degradation of chlorophyll (DiPaola & Beard, 1992).

Given the temperature range from 32 F to 54 F (0 C to 12 C), chilling symptoms can vary depending on the conditions. The most striking symptoms occur under high light intensities with rapid temperature drop to or close to freezing. Under this scenario, symptoms are expressed in 24 hours to 48 hours. Bleached-out turf areas appear as a mosaic or camouflage pattern across the turf. The bleached-out leaves are due to rapid pigment degradation.

Although we are not aware of any data or studies, the consensus opinion among researchers in this area is that the serpentine or camouflage pattern occurs because of differential set-

Fall Brings Chilling Effects

BY KARL DANNEBERGER



The reddish leaf blade of centipedegrass is due to low-temperature stress.

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ting of cold air. In other words, cold air settles into the lower areas of the turf causing more injury, similar to what occurs in a valley or at the base of a mountain range. Chilling injury can occur multiple times when temperatures drop but then rise for an extended time allowing for the turf to literally grow out of the injury.

At temperatures in the high 40s F to the low 50s F, chilling injury occurs much slower and is not as dramatic. Chilling symptoms appear more uniform and the turf color is a combination of purple, blue and red shades because of the slow degradation of chlorophyll and the corresponding expression of other pigments and carotenoids. A bluish or purple discoloration is sometimes misdiagnosed as leaf spot.

Preventing chilling injury is nearly impossible if temperatures get cold. If conditions can be predicted prior to occurring, covering the turf can help reduce the severity. Applications of gibberellic acid within hours of discoloration can help reduce the discoloration (follow label directions). Most of these practices work best if the chilling period is of short duration. Painting the turf green is another option if the discoloration is objectionable.

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