

Current state of cold-hardiness

11/16/16

The above average temperatures this fall have left many turfgrass managers wondering if the turfgrass has hardened off for the looming winter. The processes of cold-acclimation (hardening) is essential for the plant to survive the below freezing temperatures during the winter. Plants that are not thoroughly acclimated may experience direct low temperature kill – literal freezing to death. During cold acclimation, soluble sugars and proteins accumulate in the turf crown. This causes the water content of the crown to decrease from roughly 75% to 60% moisture and reduces the killing temperature of the turf. For creeping bentgrass, the temperature where 50% of the plants die (LT₅₀). can decline from roughly 14F during the season to -40F during the peak of winter.

One of the fundamental attributes of a healthy plant is the ability to sense and respond to changing environmental conditions. Cool-season turfgrass plants use the shortening day length, reduced solar intensity, and near freezing temperatures to initiate the cold-acclimation process each fall. While the days have gotten shorter and less bright, we haven't had many near freezing temperatures until recently. This has left us wondering about the cold-hardiness right now? Would a drastic reduction in air temperature cause direct low temperature kill like it did in November of 2014? What should we do minimize the risk of direct low temperature kill?

Last week we sampled the crowns of well-watered and drier tall fescue and creeping bentgrass. The samples came from the East Campus Turf Plots. The crown moisture contents were encouraging and generally ranged from 60-65%. This indicates the cold and frosty nights last week have started the cold-acclimate process, despite the warm daytime temperatures. The droughty plugs had slightly lower crown moisture than the well-watered plugs but not enough to be concerned about desiccation. A short irrigation cycle quickly corrected visible drought symptoms on the droughty turf.

Unfortunately, there is not much we can do to protect the turf from direct low temperature kill. Covers can provide some protection but their benefit is generally minimal because they offer little direct insulation value. There are products that can increase the R-value of a cover. Sand topdressing may offer some level of protection and will certainly help prevent winter dedication if we stay dry this winter.

While Nebraska is a little drier and warmer than we'd like to be for late fall, the turfgrass plants appear to be hardening off for winter. The risk of direct low temperature kill seems to be lower than it was in fall of 2014. Now we'll wait to see how dramatically the weather shifts this Friday and hope for the best.

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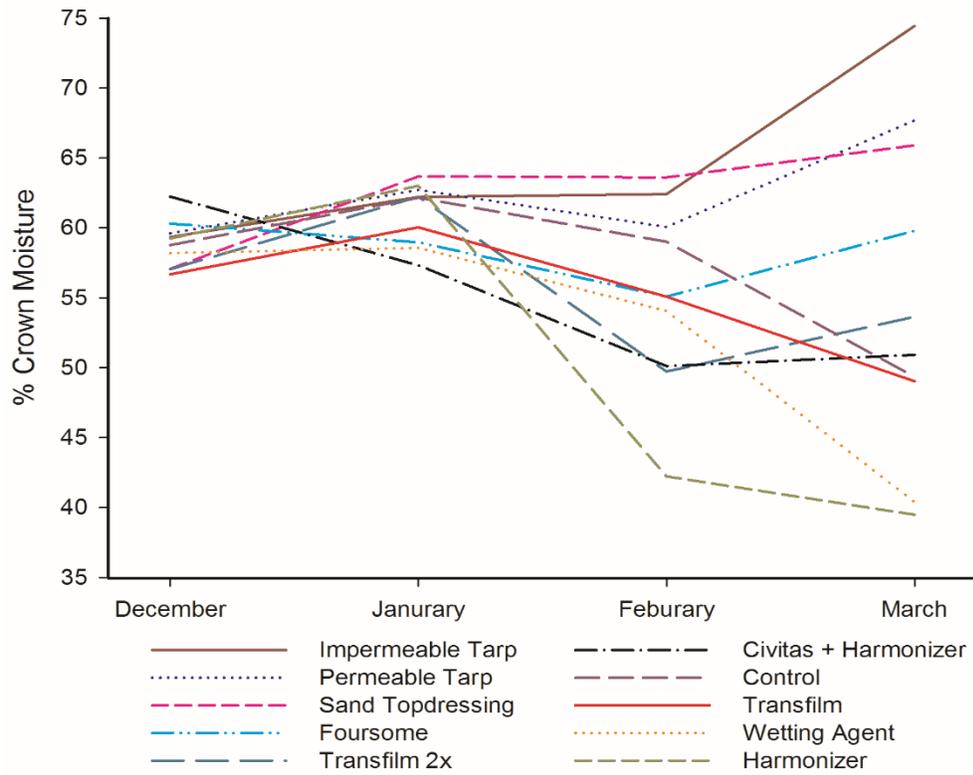


Figure 1. Crown moisture content monitored monthly at the John Seaton Anderson Turfgrass Research Center in Mead, NE. Treatments providing physical protection of the crown were able to retain moisture in the crown opposed to other treatments.

Figure 2. Crown moisture content in March at Axtell, NE. Much like the Mead site, treatments that provided a physical protective barrier kept turf above the 45% crown moisture content and recovered quicker in the spring. A different letter above the bar denotes significant difference.

