2016-10-560

Reducing ultradwarf bermudagrass putting green winter injury with covers and wetting agents

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As ultradwarf bermudagrass (*Cynodon dactylon x Cynodon transvaalensis*) putting greens move further north in the transition zone, there is an increased risk of sustaining winter injury from low temperature exposure and crown desiccation. The benefits of utilizing covers for winter protection are well-documented but there are significant labor costs associated with covering and uncovering greens during the winter to allow for play during favorable weather. While the current recommendation is to cover bermudagrass greens when the low temperature is forecasted to drop to -4 °C or 25 °F (O'Brien and Hartwiger, 2013), it may be possible to lower this forecasted temperature, resulting in fewer covering events, reduced labor costs and more days open for play.

Localized dry spot (LDS) is a common problem on sand-based putting greens and can lead to desiccation of the turfgrass crown and even death of the plant. Symptoms of LDS are easily recognized when turf is actively growing but may not be apparent while the turf is dormant. Wetting agents are commonly applied during the growing season to combat effects of LDS but little information exists on the effects of a late-fall/early-winter wetting agent application on winter survival and spring green-up of ultradwarf bermudagrass.

Objectives:

- Examine predicted low-temperature thresholds for covering Tifeagle, Champion, and Mini-Verde ultradwarf bermudagrass putting greens
- Investigate the effects of a late-fall wetting agent application on soil moisture and winter survival of ultradwarf bermudagrass

Materials and Methods:

This trial was conducted at the Arkansas Agricultural Research and Extension Center in Fayetteville, AR. The treatments included three ultradwarf bermudagrass cultivars ('Champion', 'Mini-Verde', and 'Tifeagle'), five cover treatments based on forecasted low temperatures (-4.0, -5.6, -7.8, or -9.4 °C and an uncovered control), and two wetting agent treatments (Revolution applied at 1.9 ml m^{-2} on Dec. 6, 2016 and an untreated control) The experimental design was a strip split plot, where cover treatments were applied as strip plots across cultivars and cover x cultivar plots were further split with the wetting agent treatments (Photo 1). Results from the first year of the trial (2015-2016) were summarized in the 2016 USGA Research Summary and data from the second year (2016-2017) of this trial are summarized in the current report. This research will be continued for a third season, during the 2017-2018 winter.

Results:

Fayetteville, AR experienced a more typical winter season in 2016-2017, and several days of extreme low temperatures (-15 °C) were experienced (Figure 1).

- As seen in Year 1, 'Tifeagle' and 'Mini-Verde' experienced less winter injury and better spring greenup than 'Champion' (Figures 2 and 3, Photo 2)
- Uncovered plots of all cultivars experienced complete winterkill (Figure 3, Photo 2)

- The use of protective covers enhanced spring green-up and recovery for all cultivars and there were minimal differences in any of the cover treatments (Figure 3, Photo 2)
- A late season wetting agent application did not affect spring green-up of ultradwarf greens in Year 2 (data not shown), but would still be recommended as a precaution again winter desiccation.
- Using lower temperature thresholds to place covers significantly reduced the number of covering events that occurred in 2017 and resulted in more days that the course would have been open for play (Table 1). These reductions could potentially save thousands of dollars in labor costs for a golf course each year and increase revenue by keeping the course open for play on more days in the winter season (Table 1).

Photo 1. Overview of the trial site, showing the various cover treatments stripped across the three cultivars of ultradwarf bermudagrass.

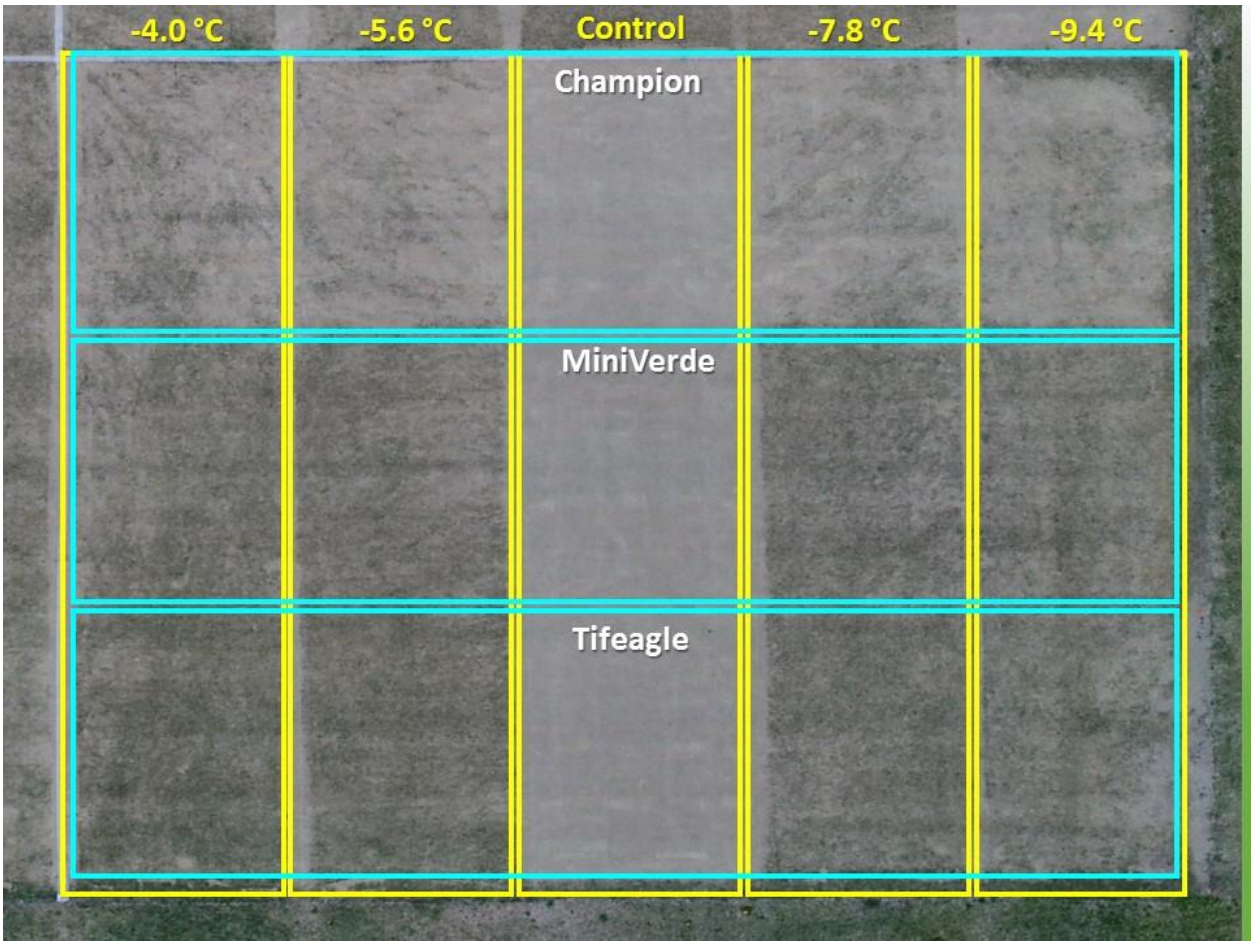

Photo 2 – Spring greenup of three ultradwarf bermudagrass cultivars exposed to various predicted low-temperature, cover thresholds – Photo taken on 18 April 2017.

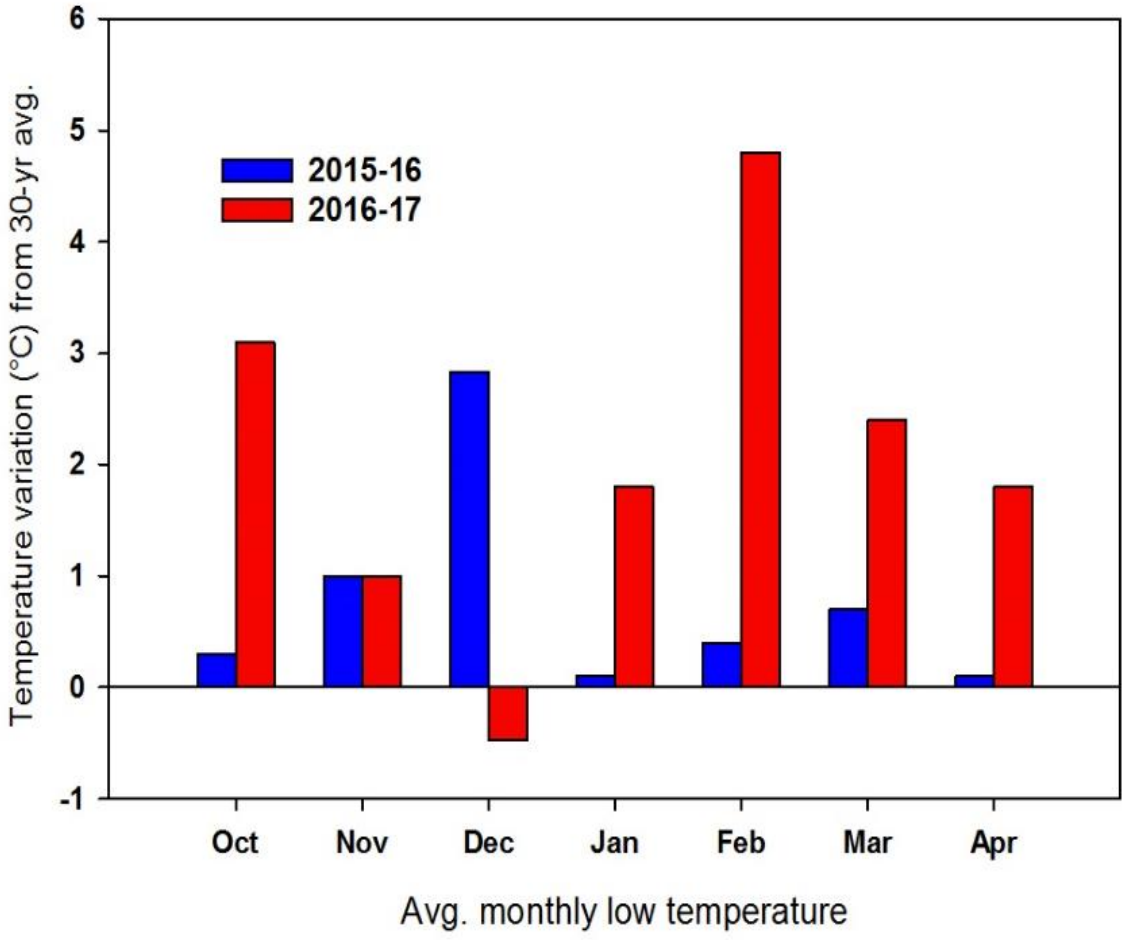

Figure 1. Average monthly low temperature deviation from the 30-yr average in Fayetteville AR during the months of the study.

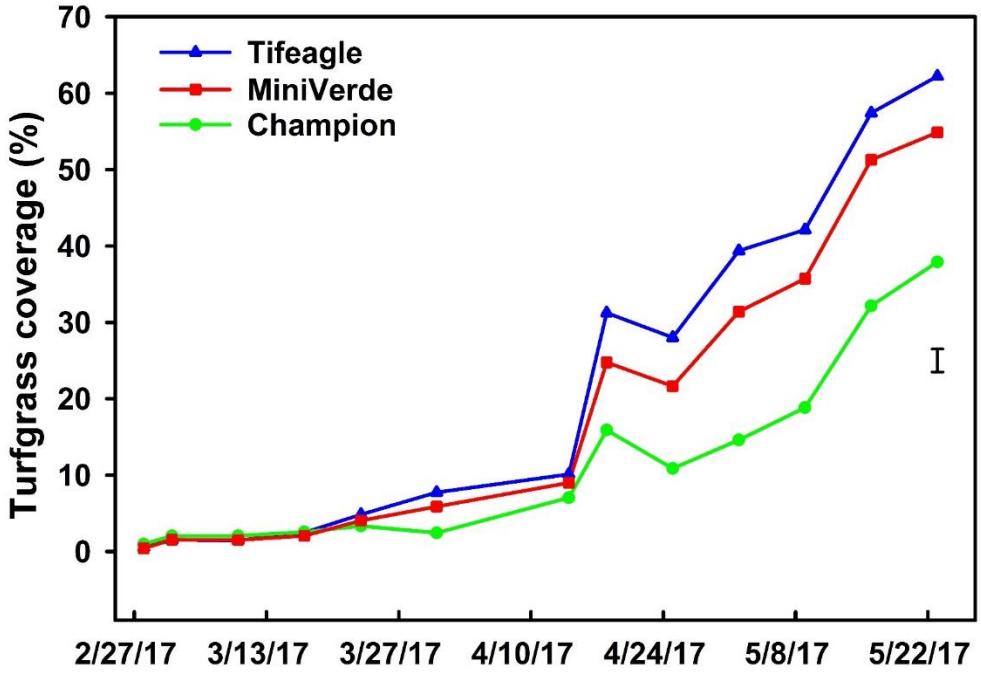

Figure 2 – Effect of cultivar on winter injury and spring greenup of ultradwarf bermudagrass in Spring 2017. Error bar represents the least significant difference (P<0.05) for comparing treatments.

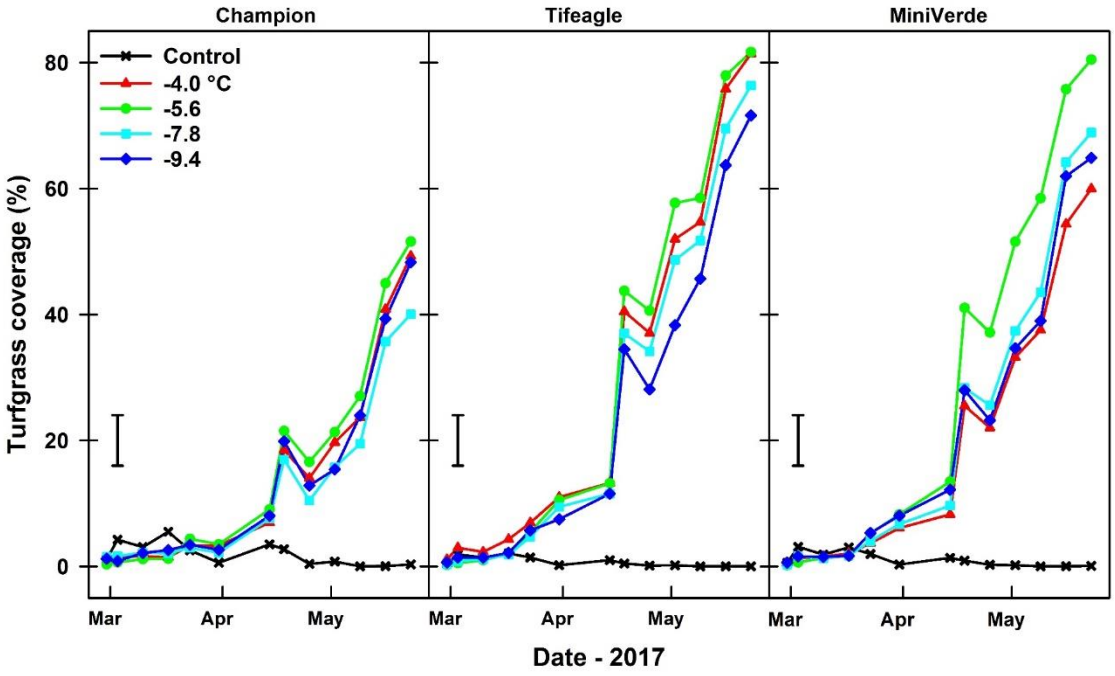

Figure 3. Cultivar by cover treatment interaction on spring greenup of ultradwarf bermudagrass greens in Spring 2017. Error bar represents the least significant difference (P<0.05) for comparing treatments.

Table 1. A two-year summary of the effects of modifying cover temperature thresholds on number of covering events, total days covered, and increased days open for play in Fayetteville AR.

Cover Treatment	Number of Covering Events (2 yr total)	Total Days Covered	Potential Savings†	Increased days open for play
-4.0 °C	18	60	-	-
-5.6 °C	14	53	$2,968	7
-7.8 °C	6	28	$8,904	32
-9.4 °C	4	19	$10,388	41

† Potential labor savings were calculated based on the estimated labor costs associated with deploying and removing covers developed by Jared Nimitz at the Peninsula Club in Cornelius, NC.. Mr. Nimitz has tracked labor for over 5 years and associated an average labor cost of $742 for each covering and uncovering event.