Excessive Winter Crown Dehydration Affects Creeping Bentgrass Cold Hardiness
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- A two-year field study was conducted during the winter of 2014-15 and 2015-16 to evaluate the effectiveness of commonly used desiccation prevention treatments.
- Heavy sand topdressing and covers provided a physical protective barrier from the environment which reduced desiccation, sustained crown moisture content, and accelerated spring green-up.
- The relationship between crown moisture and cold hardiness is currently being evaluated in a winter desiccation growth chamber.

The below abstract has been submitted for publication and is currently in the process of review:

Winter desiccation injury can severely impact golf courses in the northern Great Plains; however, little is known about its prevention. While anecdotal evidence suggests numerous prevention options are available to practitioners, the impacts these prevention practices have on turfgrass survival remain unclear. The objective of this two-year study was to evaluate the effectiveness of winter desiccation prevention treatments on turfgrass survival across multiple locations in Nebraska. To assess treatment effectiveness, crown moisture content was measured monthly from December to March at Mead, NE and in March at Axtell, NE. Visual turf quality was rated in the field at Mead, and in the greenhouse from Axtell to monitor survival and rate of spring green-up. Late fall treatments included heavy sand topdressing, a permeable or impermeable cover, anti-transpirant, turf colorant, horticultural spray oil, and wetting agent. The results from this study indicate that both protective cover treatments and sand topdressing were the best performing treatments at both Mead and Axtell (Figs. 1, 3). The crown moisture content under these treatments was as high as 0.764 g H_2O g^{-1} FW at Mead, compared to the lethally low 0.251 g H_2O g^{-1} FW observed in the control at Axtell (Figs. 1, 3). Treatments that sustained crown moisture content levels throughout the winter resulted in a higher turf quality in the spring and recovered faster at both sites (Figs. 2, 4). Sprayable products performed less consistently and rarely provided any added benefit. These results suggest that heavy sand topdressing and protective covers applied late in the fall can reduce desiccation in high-risk areas by sustaining crown moisture contents and improving turf survival, reducing the likelihood of turf death from winter desiccation.

The crown moisture/cold hardiness evaluation study conducted in the growth chamber is still in the preliminary phases. Preliminary results have shown promise but need further refinement before conclusions can be made (Fig 5). The study is still on going and expected to be completed by the summer of 2017.

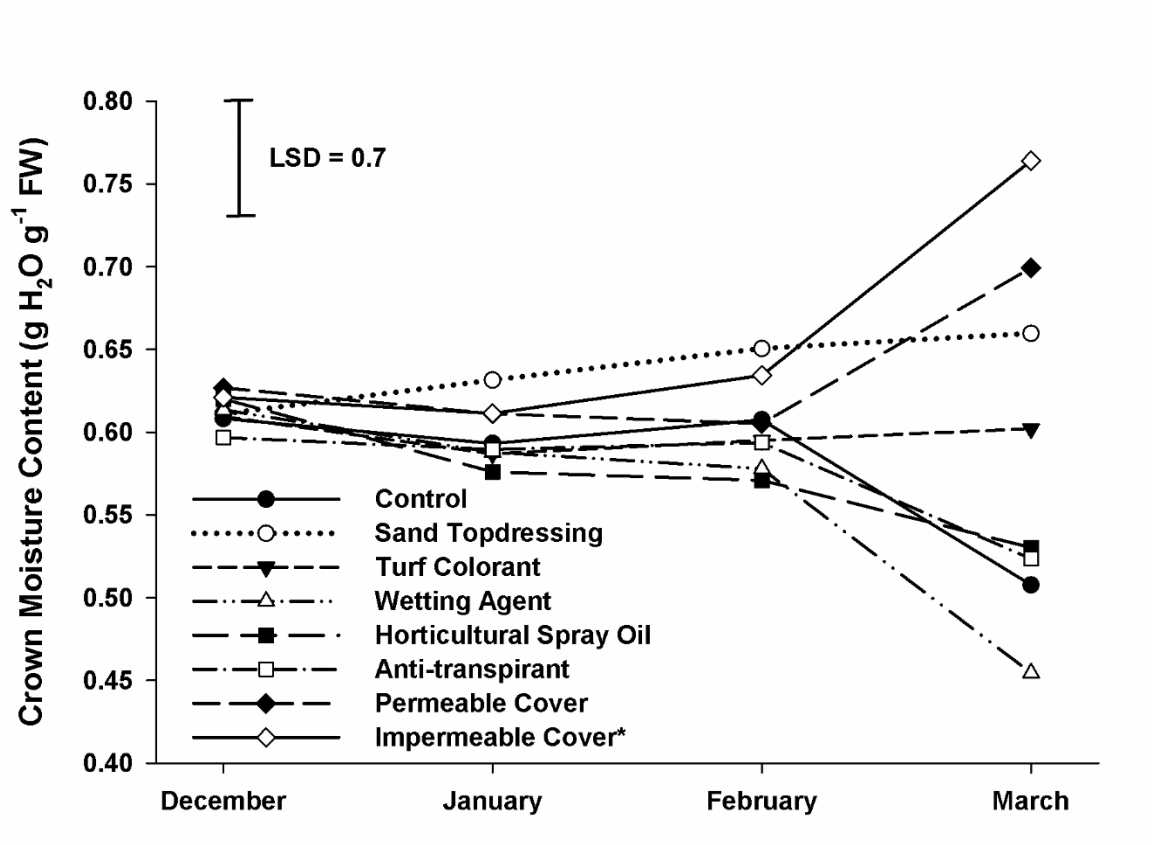


Figure 1. Crown moisture content as affected by spray-applied and cover treatments in Mead, NE. Data were pooled across 2014-15 and 2015-16 studies ($p<0.001$). *3.5 mil clear impermeable cover

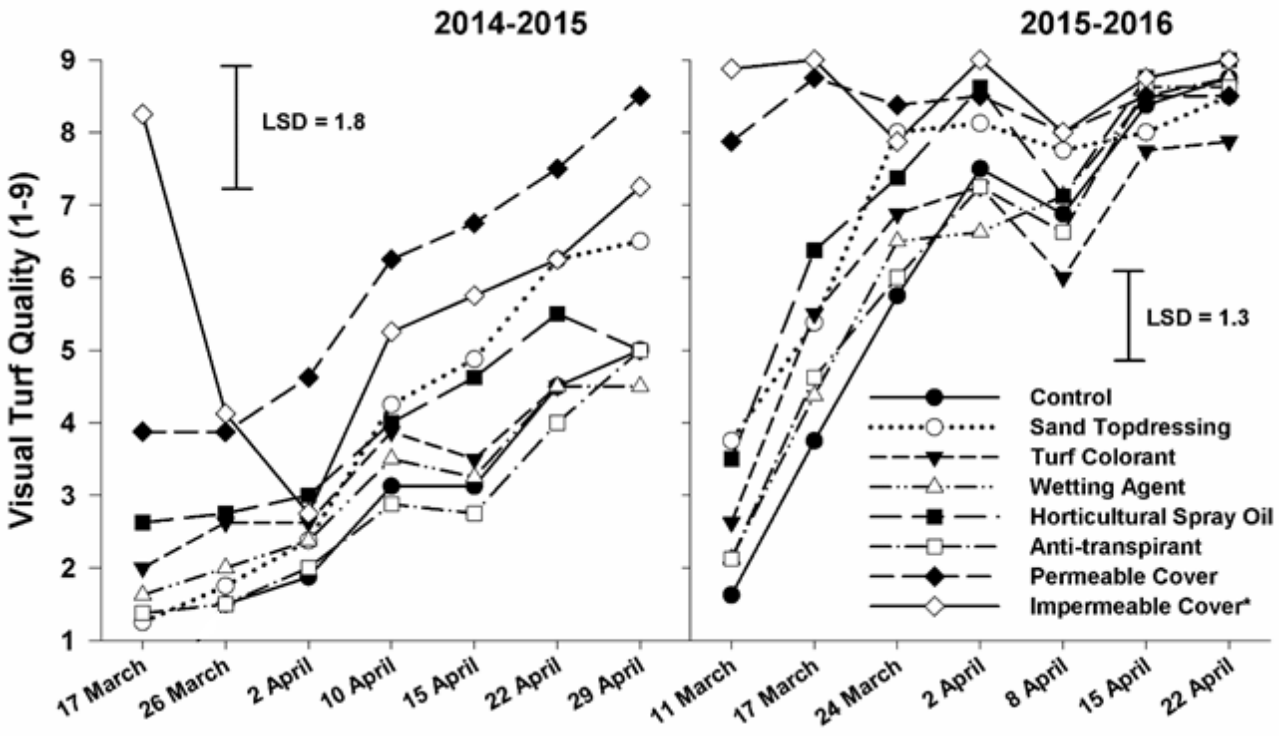


Figure 2. Visual turf quality as affected by spray-applied and cover treatments after removal of covers in Mead, NE ($p<0.001$). *3.5 mil clear impermeable cover

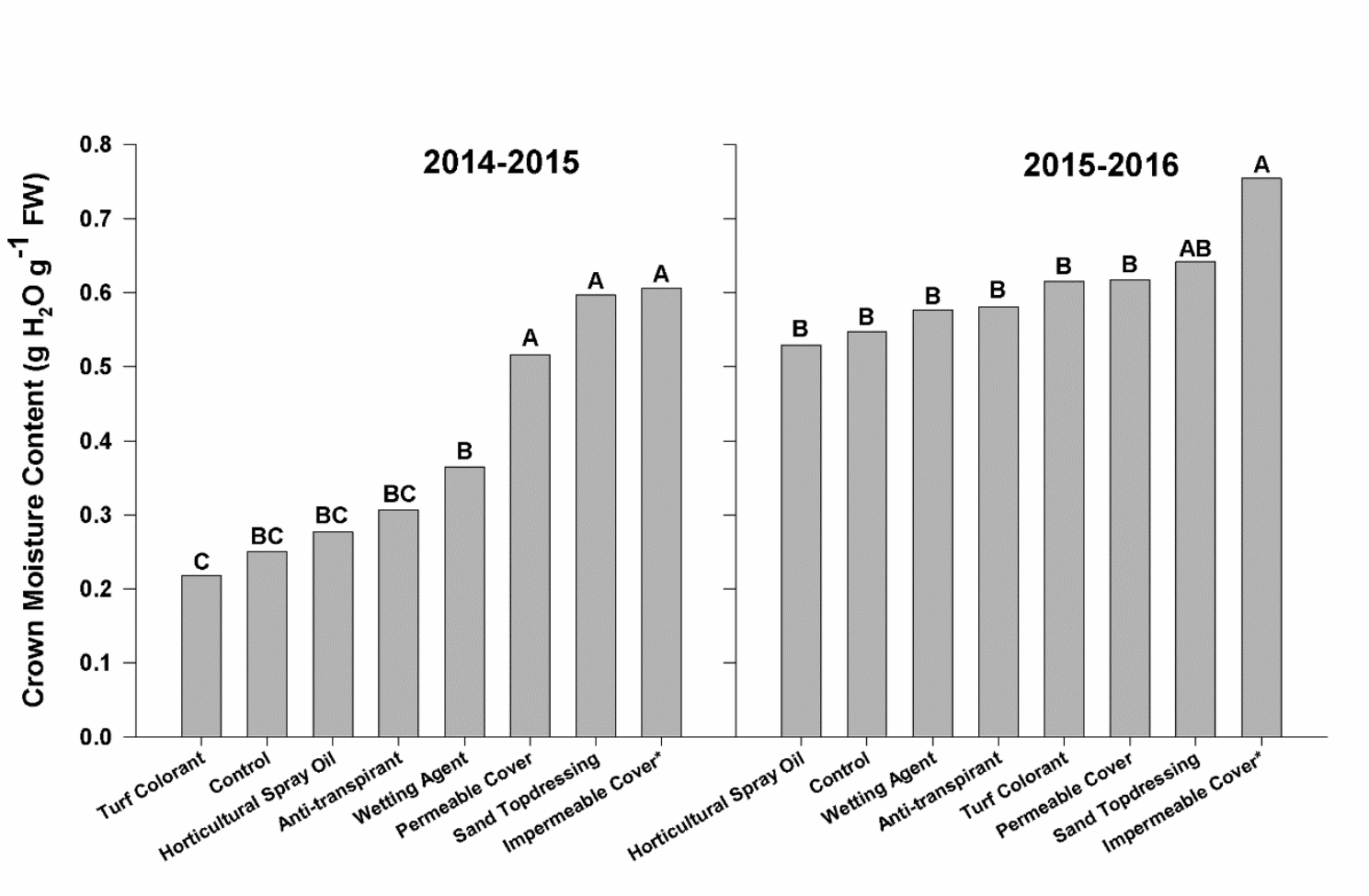
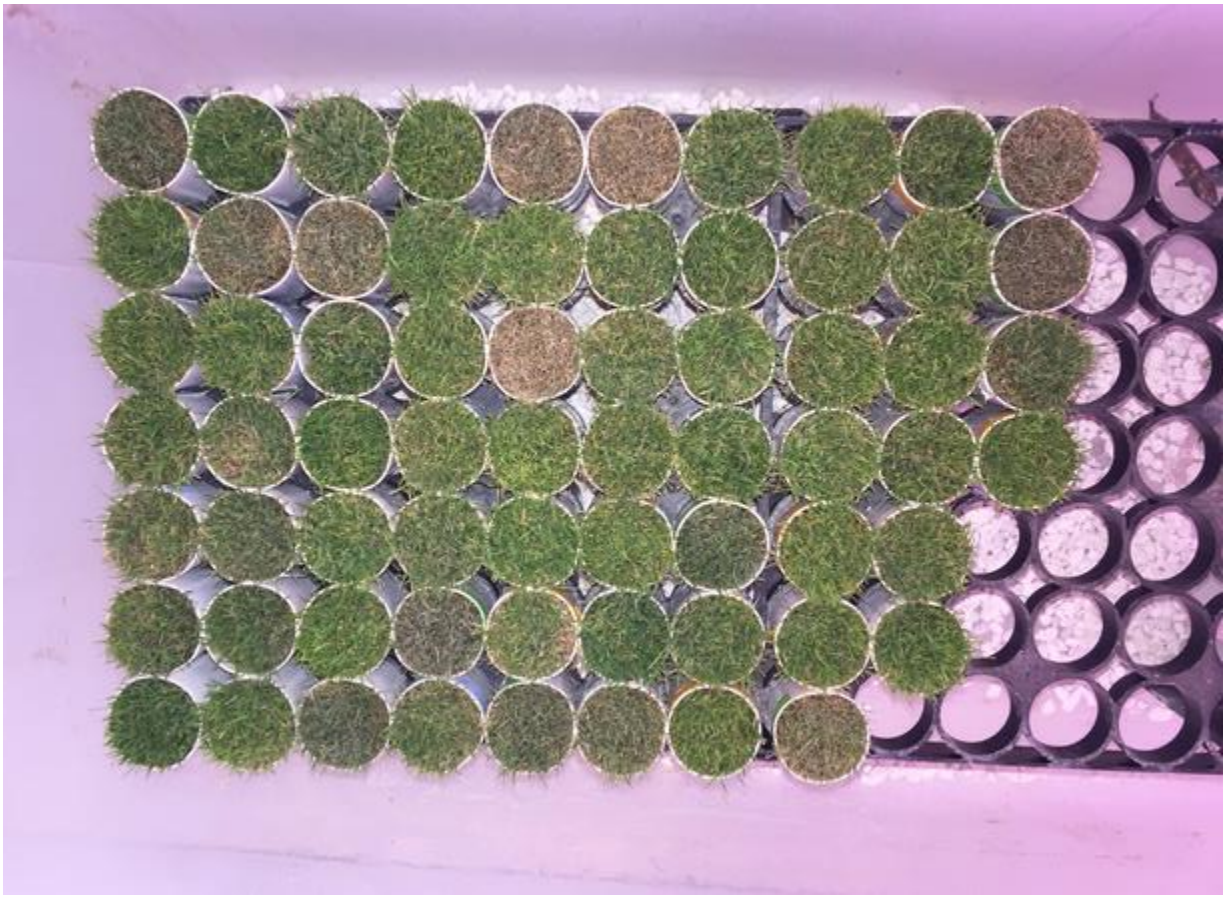

2014-2015
2015-2016
Crown Moisture Content (g H_2O g^{-1} FW)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
C
BC
BC
BC
B
A
A
A
B
B
B
B
B
B
AB
A
Turf Colorant
Control
Horticultural Spray Oil
Anti-transpirant
Wetting Agent
Permeable Cover
Sand Topdressing
Impermeable Cover*
Horticultural Spray Oil
Control
Wetting Agent
Anti-transpirant
Turf Colorant
Permeable Cover
Sand Topdressing
Impermeable Cover*

Figure 5. Deficit irrigation treatments are being applied to achieve various crown moisture content ranges. After prolonged deficit irrigation, cones are subjected to decreasing freezing temperatures to evaluate which crown moisture content range provides the greatest level of cold hardiness. Visual water stress and photooxidative stress can be observed in deficit irrigated cones.



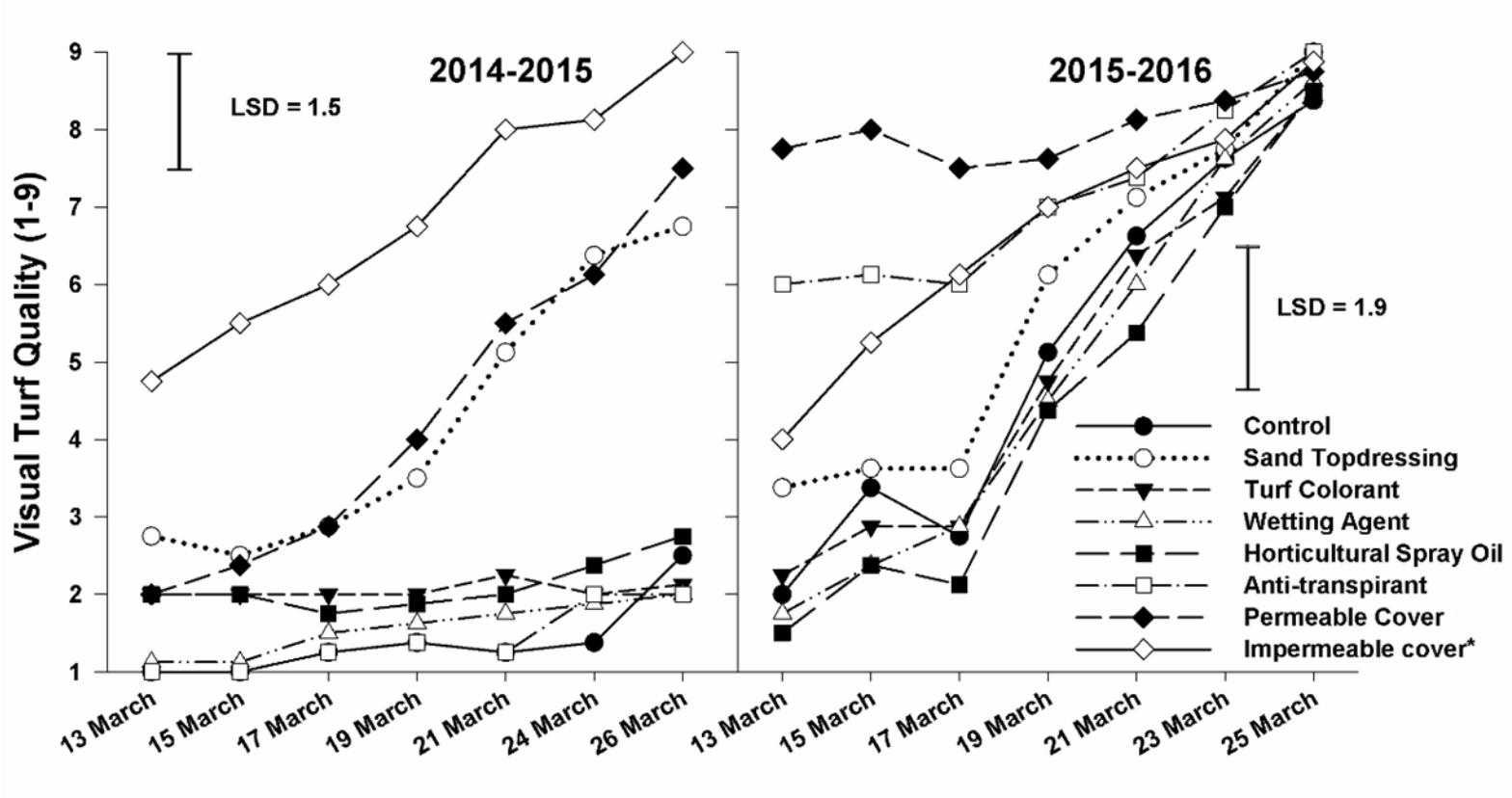


Figure 4. Visual turf quality as affected by spray-applied and cover treatments in Axtell, NE after removal of covers. Samples were evaluated in the greenhouse for recuperative capacity and rate of green-up ($p<0.001$). *White impermeable cover