



Evaluation of Turf Covers with and without Crumb Rubber for Extending Turfgrass Growing Environment



K.H. Dickson*, J.C. Sorochan, A.W. Thoms, and J.T. Brosnan

Department of Plant Sciences University of Tennessee

Abstract

Crumb rubber is an amendment used on athletic fields to reduce compaction and increase wear tolerance in highly trafficked areas. Turf covers are used on athletic fields to prevent winter injury and extend the period before fall dormancy. Turf covers are applied at night and can be removed during the day depending on temperature. Research was conducted in 2011 at the University of Tennessee Center for Athletic Field Safety (Knoxville, TN) to evaluate the effects of crumb rubber topdressing and growth covers on 'Riviera' common bermudagrass (*Cynodon dactylon* L.) for percent green cover retention. A randomized complete block factorial design was used having four treatments replicated four times. No significant differences were found in soil temperature among the treated plots. Statistical differences were observed with percent cover ratings in plots receiving covers and crumb rubber plus covers when compared to the control and plots receiving only crumb rubber.

Introduction

- Traffic on athletic fields reduces turf cover leading to soil compaction and increased injury potential (Rogers and Waddington, 1988). Surface hardness can be managed by selecting a turfgrass species capable of providing a uniformly dense and resilient turf while being trafficked. Trappe et al. (2011) reported that 'Riviera' common bermudagrass exhibited excellent traffic tolerance using the Cady Traffic Simulator.
- To keep common bermudagrass actively growing during cooler fall weather turf managers can use covers to augment canopy temperature potentially allowing common bermudagrass to better tolerate traffic.
- Crumb rubber has also been identified as a potential tool for mitigating the negative effects of foot traffic. Crumb rubber topdressing resulted in a significant increase in turfgrass wear tolerance, and a decrease in surface hardness, soil bulk density, and shear resistance (Goddard et al., 2008). However, effects of crumb rubber on extending the period of common bermudagrass growth in fall are unknown.
- In 2011, a study was conducted at the University of Tennessee Center for Athletic Field Safety (Knoxville, TN) to compare the performance of an Evergreen™ turf cover (Covermaster Inc.) and late season crumb rubber topdressing on Riviera bermudagrass during fall. Evergreen™ turf cover was selected for its common use on athletic fields.

Objectives

To determine:

- If use of a turf cover, late season crumb rubber topdressing, or their combination can extend the fall growing season for 'Riviera' common bermudagrass in the transition zone.
- Effects of a turf cover and late season crumb rubber topdressing on soil temperature.

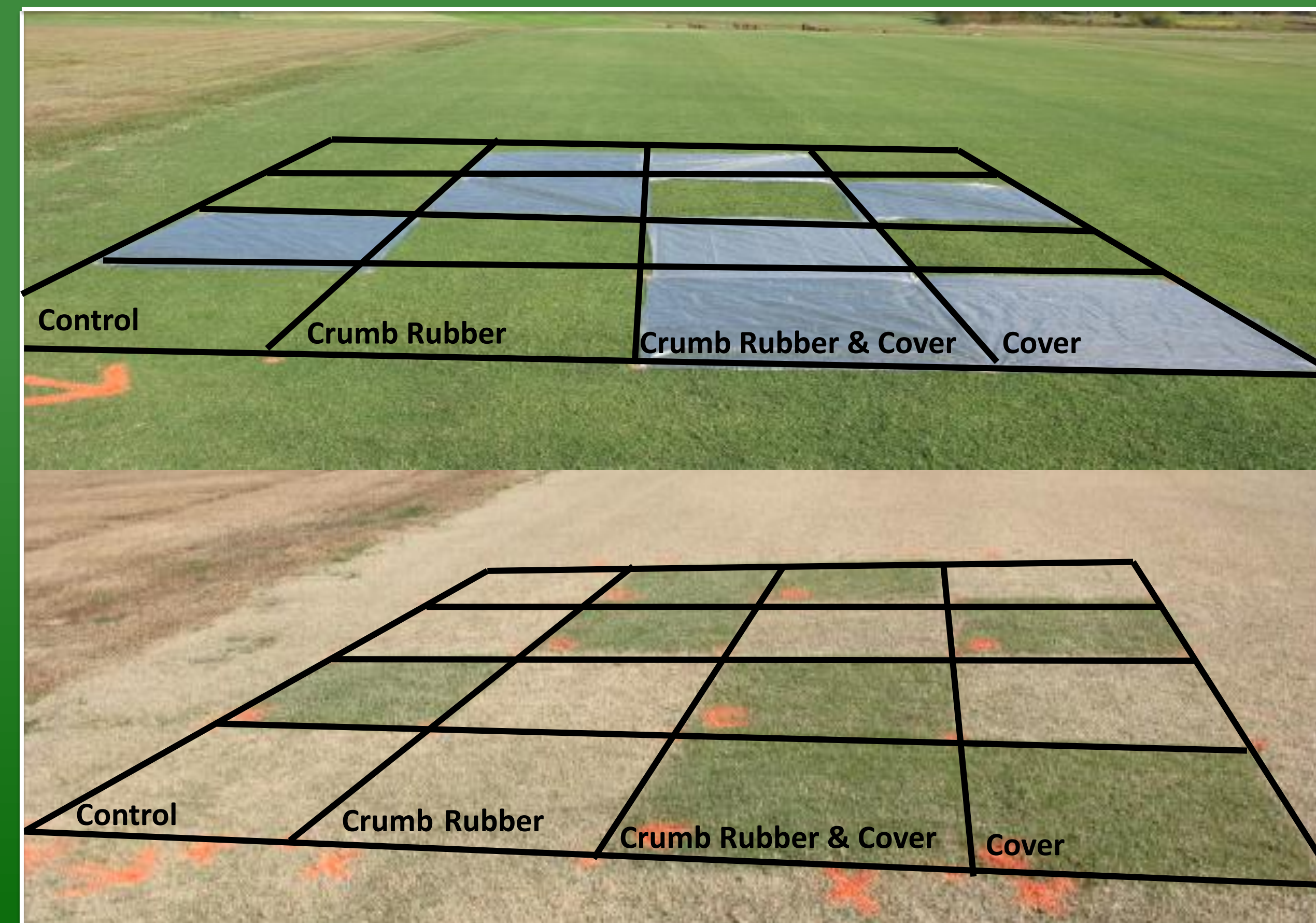


Figure 1. 'Riviera' bermudagrass (*Cynodon dactylon*) plots at the beginning (21 Oct) and end (3 Dec) of a crumb rubber and turf cover study in Knoxville, TN in 2011.

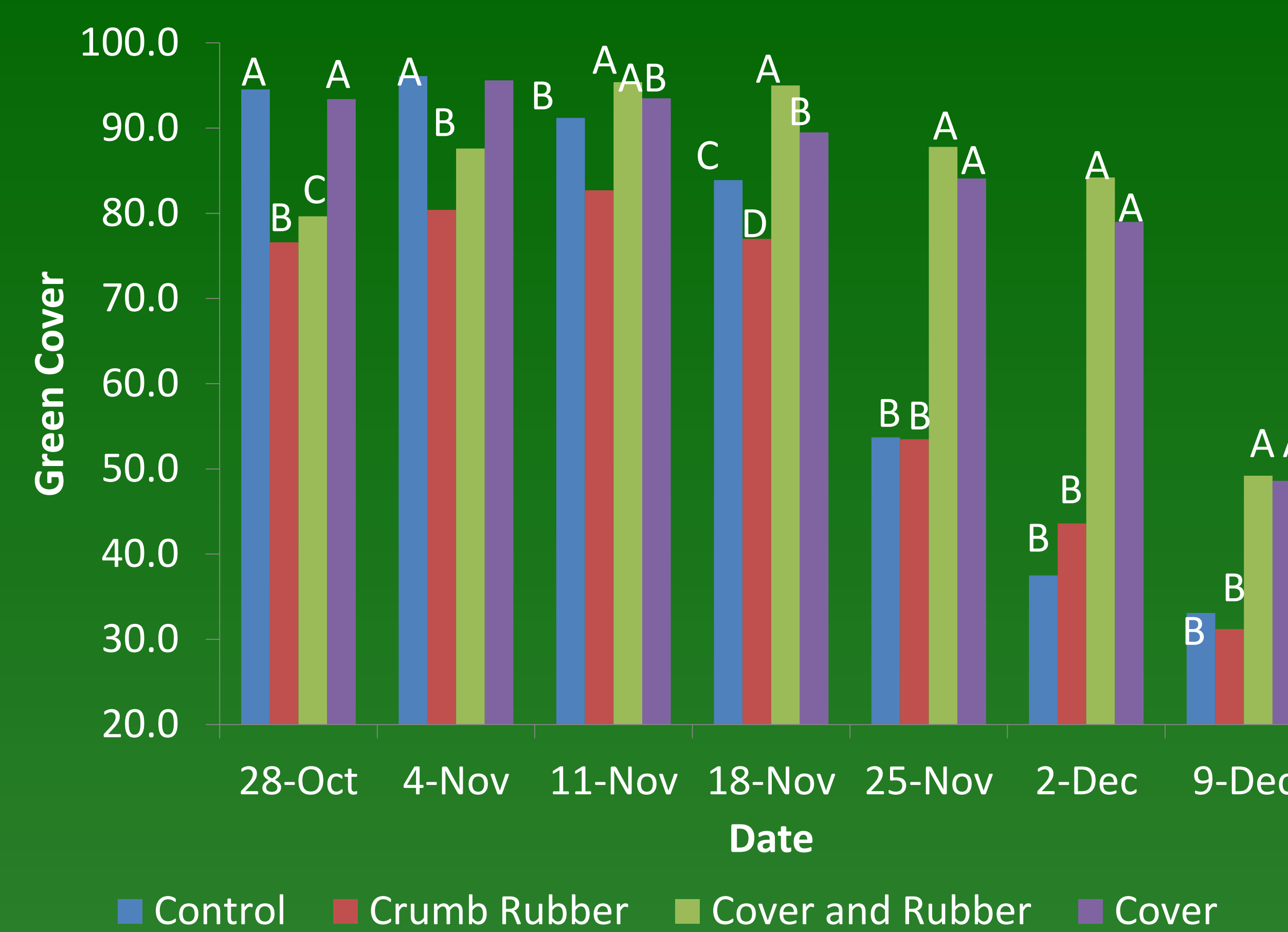


Figure 2. 'Riviera' bermudagrass (*Cynodon dactylon*) green cover following crumb rubber topdressing (12 mm) and turf cover applications during fall 2011 in Knoxville, TN. Means sharing a letter are not significantly different according to Fisher's LSD test.

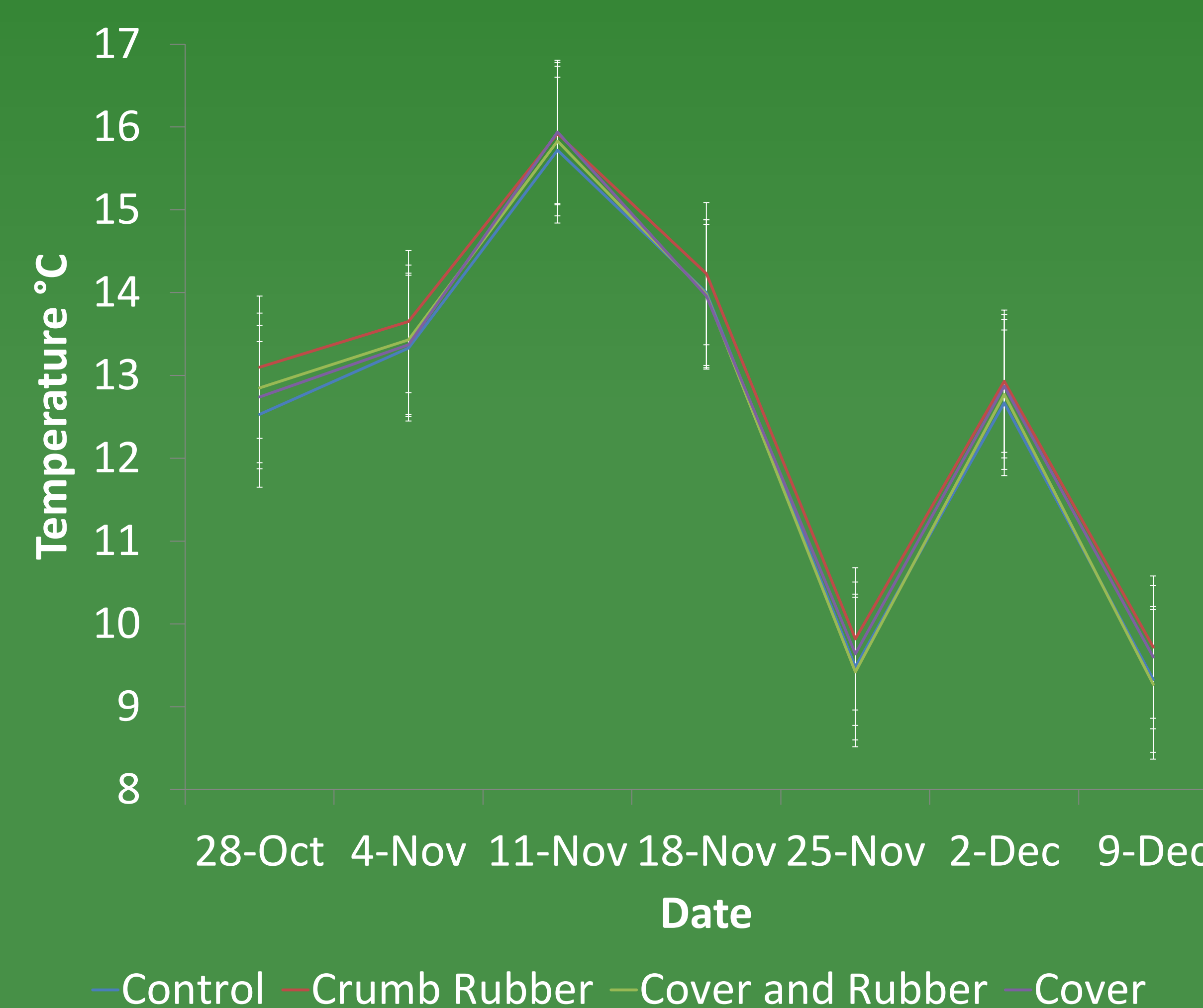


Figure 3. 'Riviera' bermudagrass (*Cynodon dactylon*) average nightly soil temperature at a 25 mm depth during fall 2011 in Knoxville, TN. Errors bars represent Fisher's LSD values at $P < 0.05$.

Materials and Methods

- Experimental design was a randomized complete block replicated four times. Treatments included the factorial combination of using an Evergreen™ turf cover, crumb rubber topdressing (6mm), or leaving turf untreated.
- On 21 October 2011 crumb rubber topdressing was applied to 1.5 m² plots at a 6 mm depth (272 kg ha⁻¹) in two increments 7 days apart, with all crumb rubber plots receiving a total 12 mm.
- Evergreen™ turf cover treatments were removed at 8:00 h each morning and re-applied at 17:00 h each evening from 21 October through 10 December 2012. The Evergreen™ turf cover was a translucent polyethylene that allowed light and air through to the turf.
- Soil temperature was monitored hourly at a 25 mm depth throughout the study using data loggers accurate to $\pm 1.1^\circ$ C within a range of -50 to 280° C (WatchDog b series button loggers; Spectrum Technologies, Plainfield, IL).
- Data collection included digital image analysis using a light box and SigmaScan Pro© to determine percent green cover according to Karcher et al. (2003).
- Hourly soil temperature and percent green cover data were analyzed using a mixed model ANOVA in SAS. Fisher's protected least significant test was used to separate treatment means at $P < 0.05$.

Results

- Beginning 4 weeks after treatment application (18 Nov), plots receiving a turf cover maintained higher percent green cover than plots without a turf cover.
- Late season crumb rubber topdressing plus application of a turf cover provided the highest percent green turf cover from 3 to 6 weeks after treatment.
- No significant differences in soil temperature were observed between treatments.

Conclusions

- Use of a turf cover with and without late season crumb rubber topdressing provided the greatest percent green turf cover. Cover application may have protected the canopy from low air temperatures during the evening; however, canopy temperature was not measured in this study.
- Future studies warrant investigating effects of the use of a turf cover on both soil and canopy temperature.
- Economic comparisons investigating the costs of overseeding bermudagrass versus using turf covers with and without late season crumb rubber topdressing are warranted.

Literature Cited

- Goddard, M. J.R., J.C. Sorochan, J.S. McElroy, D.E. Karcher and J.W. Landreth. 2008. The effects of crumb rubber topdressing on hybrid Kentucky bluegrass and bermudagrass athletic fields in the transition zone. *Crop Sci.* 48:2003-2009.
- Karcher, Douglas E.; Richardson, Michael D. 2003. Quantifying turfgrass color using digital image analysis. *Crop Sci.* 43: 943-951.
- Rogers, J. N. III, D.V. Waddington. 1988. editors Schimdt, Hoerner, Milner, Morehouse. 45 Portable apparatus for accessing impact characteristics of athletic field surfaces. Natural and artificial playing fields. ASTM STP 1073:p. 96-99
- Trappe, J.M., D.E. Karcher, M.D. Richardson, and A.J. Patton. 2011. Shade and traffic tolerance varies for bermudagrass and zoysiagrass cultivars. *Crop Sci.* 51:870-877.

Acknowledgements

Special thanks to Liberty Tire Recycling for their financial support of this research.