Segway and Golf Car Wear on Dormant Bermudagrass Fairways

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Photo by Doug Karcher

Research comparing the tolerance of a bermudagrass fairway to Segway and golf cart traffic

Additional index words: *Cynodon dactylon* × *C. traansvalensis*, traffic, greenup

Kauffman A., J. Sorochan, D. Karcher, and T. Samples. 2009. Segway and golf car wear on dormant bermudagrass fairways. Arkansas Turfgrass Report 2008, Ark. Ag. Exp. Stn. Res. Ser. 568:40-44.

Summary. Recently, the Segway X2 personal transporter was introduced as an alternative to riding golf cars. Previous research compared the impact of these transporters on actively growing bermudagrass, but their impact on bermudagrass during winter dormancy is unknown. The objective of this research was to compare the effects of the Segway and traditional golf car on turf wear and spring green-up of 'Tifway' bermudagrass fairway turf trafficked during winter dormancy. In Tennessee, Segway traffic caused less wear on dormant bermudagrass turf than traditional golf car traffic and overall turning traffic caused more wear than stopping traffic, while spring green-up was not affected by vehicle type in Arkansas and Tennessee in 2008.

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Concentrated and repeated golf car traffic decreases turf quality by causing direct turfgrass injury and soil compaction. During dormancy, crown tissues of warm-season turfgrasses are more easily injured and dessicated, which often leads to decreased dormant turf cover and poor winter survival and spring greenup (Carrow and Johnson, 1996). Golf car traffic during the dormant period can further contribute to crown injury and a loss of turfgrass cover because of forces exerted on the outside portion of the tire during turns and the entire tire surface on starts and stops.

The Segway X2 personal transporter was recently introduced to the golf industry as an improvement on the Segway GT. Sorochan et al. (2006) reported that the Segway GT created less wear and soil compaction than traditional golf cars on actively growing bermudagrass (*Cynodon* spp.). Karcher and Landreth (2008) reported that both Segway units caused less turf loss and lower soil-surface hardness than a traditional golf car. The objective of this research was to compare the wear and spring green-up of both the Segway X2 and the traditional golf car on dormant bermudagrass fairway turf.

Materials and Methods

This study was conducted on 'Tifway' bermudagrass turf maintained under golf course fairway conditions at the University of Arkansas Research and Extension Center in Fayetteville and the East Tennessee Research and Education Center in Knoxville. Both sites were located on silt loam soils and mowed three times weekly at 0.5 inches.

At each site, traffic was applied using a Segway X2 and standard golf car (Tennessee – Club Car Model-DS Electric Golf Car; Arkansas – Model E-Z-GO TXT Electric Golf Car). From 12 February to 8 April 2008, each traffic treatment was applied at 10 passes weekly to simulate low traffic volume during winter play. Treatments were applied to four replicate plots in Arkansas and three replicate plots in Tennessee. Plots were arranged such that each had two fixed points: one point to simulate starting and stopping wear and the other point to simulate turning wear (Sorochan et al., 2006). A single pass consisted of starting the Segway or golf car at the start/stop point, completing a 180° turn around the turning point, then returning to and stopping at the start/stop point.

Vehicle start/stop and turning points for each plot were rated for turf quality, dormant turf cover, green turf cover, and surface hardness. Turf quality was evaluated using a 1 to 9 scale in which 9 represented ideal turf and 1 represented dead turf. A rating of 5 was assigned to indicate minimum acceptable turf quality. Dormant turf cover was also rated as the percentage of the plot covered by dormant turf, as opposed to bare ground, on a 0 to 100 scale. On emergence from dormancy, digital images were collected at both the inside and outside tire locations of the start/stop and turning points for each plot to determine the percent green turf cover, and analyzed using digital image analysis (Richardson et al., 2001).

Results and Discussion

In Tennessee, the Segway X2 showed higher turf-quality ratings than traditional golf car traffic after 26 February (Fig. 1). Golf car start/stop traffic took longer to reach acceptable turf quality than Segway traffic as turf emerged from dormancy (Fig. 1). At Arkansas, turning Segway traffic had significantly lower turf quality than all other vehicle and traffic types from 20 March to 23 April (Fig. 1). However, bermudagrass receiving turning Segway traffic increased visual quality slightly once plant growth resumed in the spring, while no other treatments advanced in quality.

In Tennessee, both types of Segway traffic had higher dormant turf cover than either type of golf car traffic. At the end of the dormancy period, turf trafficked with the Segway maintained no less than 83% dormant turf cover, while turf trafficked with the golf car had less than 70% dormant turf cover (Fig. 2).

In Arkansas, differences in vehicle and traffic type were significant only after 20 March, when dormant turf cover of all traffic and vehicle types was greater than turf cover of plots receiv-

ing turning Segway traffic. However, no differences in dormant turf cover were observed between either golf car traffic type and Segway start/stop traffic. At the end of the dormancy period, turf receiving Segway turning traffic maintained no more than 47% dormant turf cover, while turf receiving all other treatments maintained less than 65% dormant turf cover (Fig. 2).

No differences in green turf cover were observed in Tennessee until the last two evaluation dates, where both Segway traffic types and turning golf car traffic showed greater green turf cover and emerged from dormancy earlier than stopping golf car traffic, but did not differ amongst themselves (Fig. 3).

In Arkansas, neither vehicle type nor traffic type significantly impacted green turf cover until the final two evaluation dates, when Segway start/stop traffic showed greater green turf cover than all other traffic and vehicle types (Fig. 3). These results show that all forms of traffic during winter had little impact on emergence from dormancy.

Overall, the Segway X2 personal transporter produced no more wear on dormant bermudagrass than traditional golf car traffic and may produce less wear on dormant bermudagrass turf than traditional golf car traffic in some situations. Dormant and actively growing bermudagrass maintained higher turf quality when trafficked with the Segway rather than a golf car in Tennessee, but differences between the Segway and golf car were not consistent in Arkansas. Golf car traffic also reduced dormant turf cover over Segway traffic in Tennessee, but did not impact spring green-up. Use of the Segway X2 personal transporter as an alternative to traditional golf cars during dormant periods has the potential to increase winter aesthetics and preserve the quality of dormant surfaces for winter play.

Literature Cited

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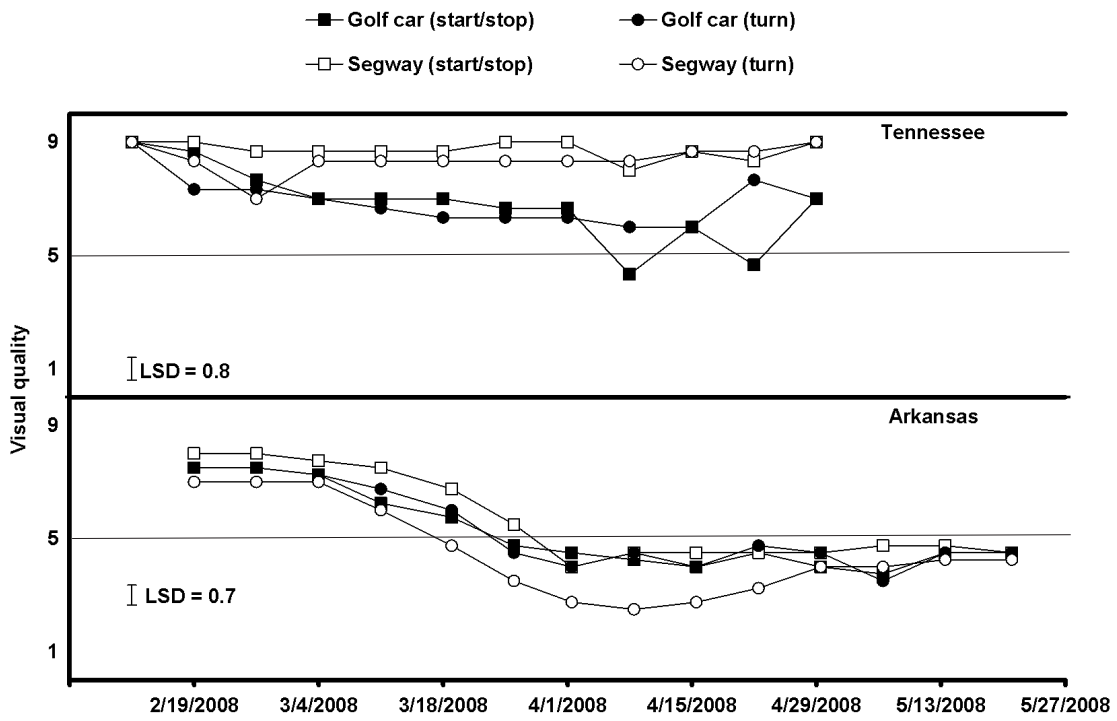

Fig. 1. Effect of traffic type x vehicle type interaction on turf quality at Tennessee and Arkansas. Rating of 1 indicates bare ground or dead turf, 5 indicates minimum acceptable quality, and 9 indicates ideal turf. Error bars represent $LSD_{0.05}$ values for separating treatment means within each date and location.

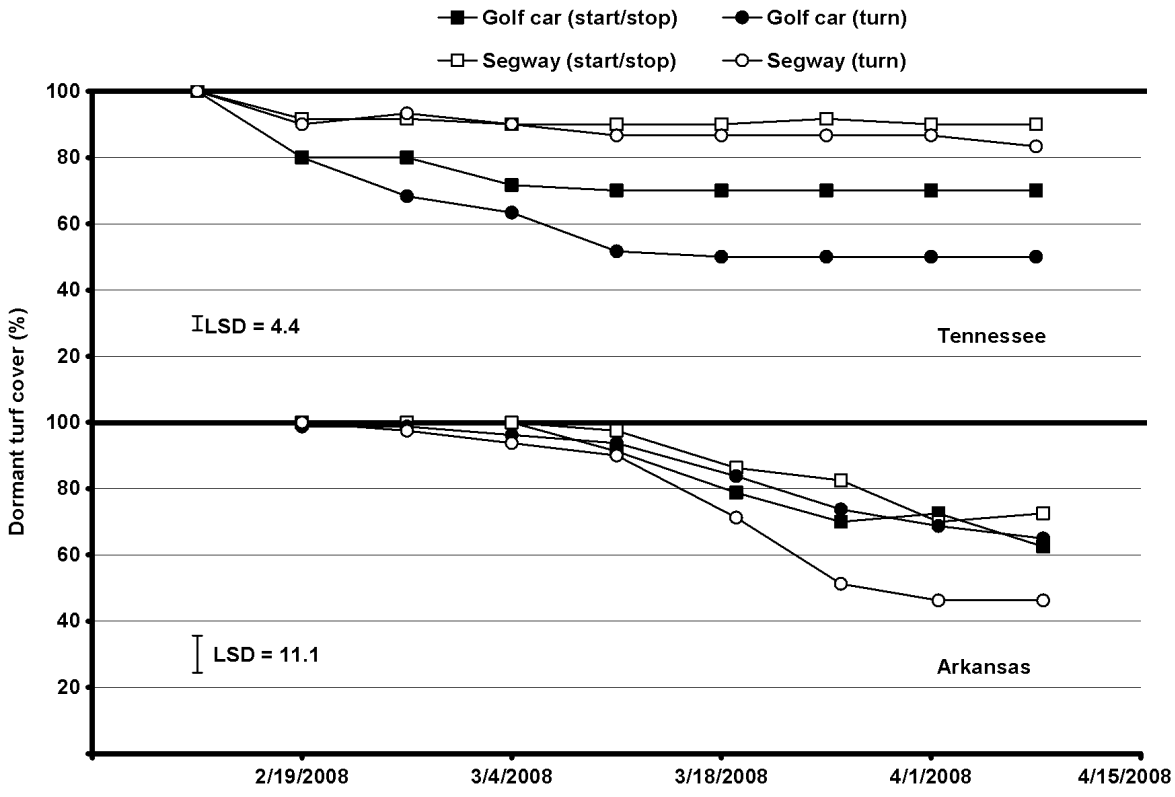

Fig. 2. Traffic type x vehicle interaction effect on the percentage dormant turf cover at Tennessee and Arkansas. Error bars represent $LSD_{0.05}$ values for separating treatment means within each date and location.

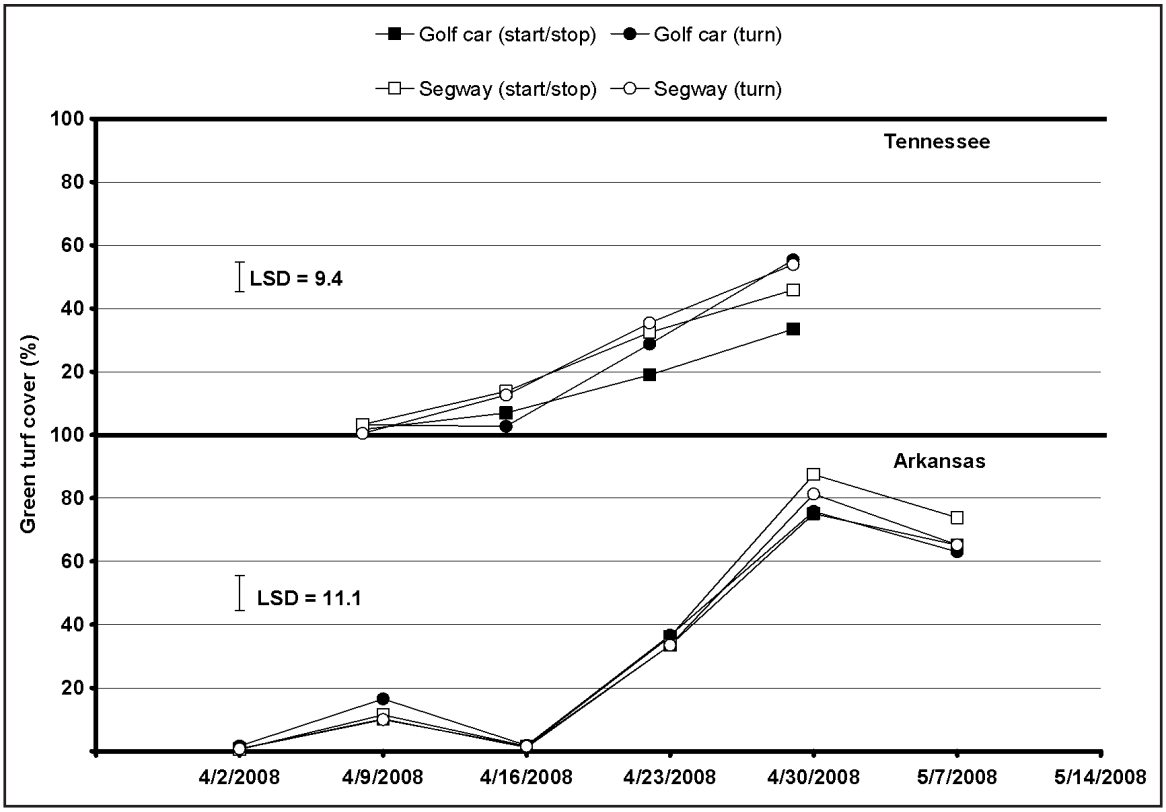

Fig. 3. Traffic type x vehicle interaction effect on the percentage green turf cover at Tennessee and Arkansas. Error bars represent $LSD_{0.05}$ values for separating treatment means within each date and location.