Traffic Tolerance of a Bermudagrass Fairway to Segway Vehicles

Doug Karcher[1] and Josh Landreth[1]

Additional index words: golf cart, 'Tifway', *Cynodon dactylon* x *C. transvaalensis*, digital image analysis

Karcher, D. and J. Landreth. 2008. Traffic tolerance of a bermudagrass fairway to Segway vehicles. Arkansas Turfgrass Report 2007, Ark. Ag. Exp. Stn. Res. Ser. 557:21-23.

Photo by Doug Karcher

Damage caused by golf cart traffic

Summary. The Segway X2 was recently introduced as an alternative vehicle to a riding golf cart and is an updated version of the Segway GT. The objective of this research was to compare the wear caused by traffic from a typical golf cart, a Segway X2, and a Segway GT applied to a bermudagrass fairway. Over the duration of the study, plots trafficked with Segway models had better turf coverage, turf color, and softer surfaces than plots trafficked with a golf cart. These results suggest that both the X2 and GT Segway models can be used as an alternative to golf carts without adversely affecting turf quality under normal operating conditions.

[1] University of Arkansas, Department of Horticulture, Fayetteville, Ark. 72701

Regular golf cart traffic on golf course turf will decrease turfgrass quality over time, particularly in areas used to enter and exit the fairway. The Segway GT model was introduced to the golf industry a few years ago as an alternative to traditional, riding golf carts. Research conducted on the Segway GT at the universities of Arkansas and Tennessee concluded that this vehicle caused significantly less wear to bermudagrass fairway turf compared to a standard riding golf cart (Sorochan et al., 2006). The Segway X2 is a new golfer transport vehicle that is an update of the GT model and is designed for better maneuverability on golf course terrain. The Segway X2 has a new steering mechanism and larger tires with aggressive tread, so it is unclear how this new model will wear fairway turf compared to the GT. The objective of this research was to compare fairway turfgrass wear caused by traffic from a typical riding golf cart, a Segway GT, and a Segway X2.

Materials and Methods

Experimental area. This study was conducted at the University of Arkansas Research and Extension Center in Fayetteville, Ark., on a silt loam soil established with 'Tifway' bermudagrass (*Cynodon dactylon* x *C. transvaalensis*). Twelve plots that were each 15 by 15 ft. were constructed for traffic application. All plots were mown three times per week at a 0.5 inch height and otherwise maintained similar to golf course fairway conditions.

Treatments. Traffic treatments included a standard Club Car golf cart, the Segway GT, and the Segway X2. Beginning on 21 June 2007, each traffic treatment was applied to four replicate plots two days per week for four weeks. During the first three weeks of traffic application, 30 passes were made on each plot with the appropriate vehicle on days when traffic was applied. During the final week of traffic application, 60 passes were made per plot on each traffic application day to represent very intensive traffic pressure. A traffic pass consisted of either the golf cart or a Segway pulling onto the plot and stopping at a fixed point, then starting rapidly and finally turning sharply at another fixed point to exit the plot. Traffic treatments were discontinued when significant wear damage was present on the experimental area.

Evaluations. Green turf coverage (color data were removed) and surface hardness were evaluated throughout the study on each plot at each fixed start/stop and turning point: Green turf coverage was evaluated twice weekly using digital image analysis techniques. Surface hardness was evaluated using a Clegg Impact Soil Tester at the beginning, mid-point, and end of the study.

Results and Discussion

Percent green cover. The golf cart treatment resulted in significantly less turf coverage than the Segway treatments on all but the initial evaluation date and the 9 July evaluation date (Fig. 1). No traffic had been applied on the initial evaluation date, so no differences were expected. Between 9 July and the previous traffic application, weather conditions were ideal for recovery (hot temperatures and significant rainfall). However, wet soil conditions during the next treatment date resulted in substantial differences in turf coverage on the 13 July evaluation date. These results suggest that the Segway vehicles cause much less damage to turf when soil conditions are relatively wet.

Surface hardness. Surface hardness was not affected by vehicle type during the first two evaluation dates, corresponding to 2.5 weeks and 150 traffic passes (Fig 3). However, at the end of the study, after 4 weeks and 300 passes of traffic, vehicle type significantly affected surface hardness. The golf cart treatment had a significantly harder surface than either Segway treatment.

Results from this study demonstrate that both the Segway X2 and Segway GT do less damage to fairway turf than a traditional golf cart and are similar to findings by Sorochan et al. (2006), which showed that a Segway GT caused less turfgrass wear damage than a golf cart. In the present study, there were no significant differences between the two Segway models; thus, both would

be considered ideal for golf course use compared to a golf cart with respect to turfgrass wear damage.

Literature Cited

Sorochan, J.C., D.E. Karcher, J.M. Parham, and M.D. Richardson. 2006. Segway and golf car wear on bermudagrass fairway turf. Online. Applied Turfgrass Science doi:10.1094/ATS-2006-0727-01-RS.

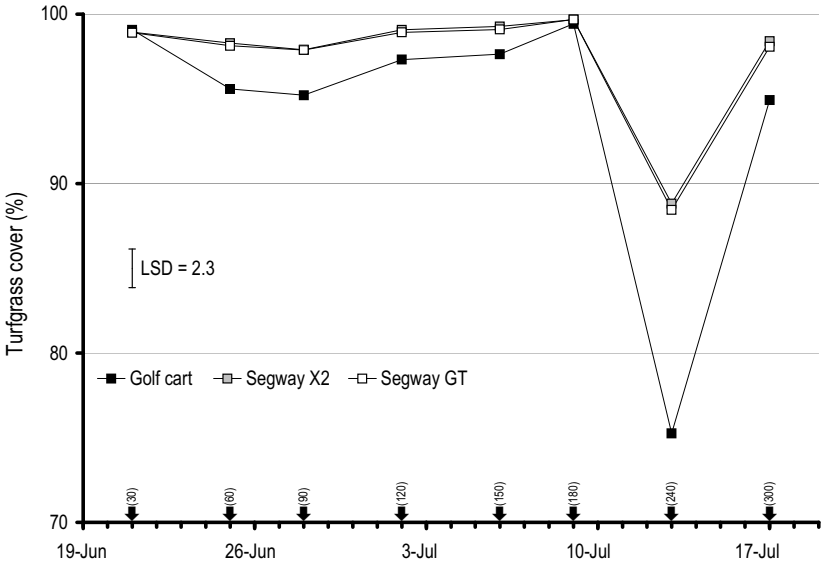

Fig. 1. Percent green turf coverage as affected by vehicle type and evaluation date. Arrows along the x-axis indicate dates of traffic application and cumulative number of passes applied. Error bar represents Fisher's least significant difference value (α = 0.05) for comparing vehicle treatments within dates.

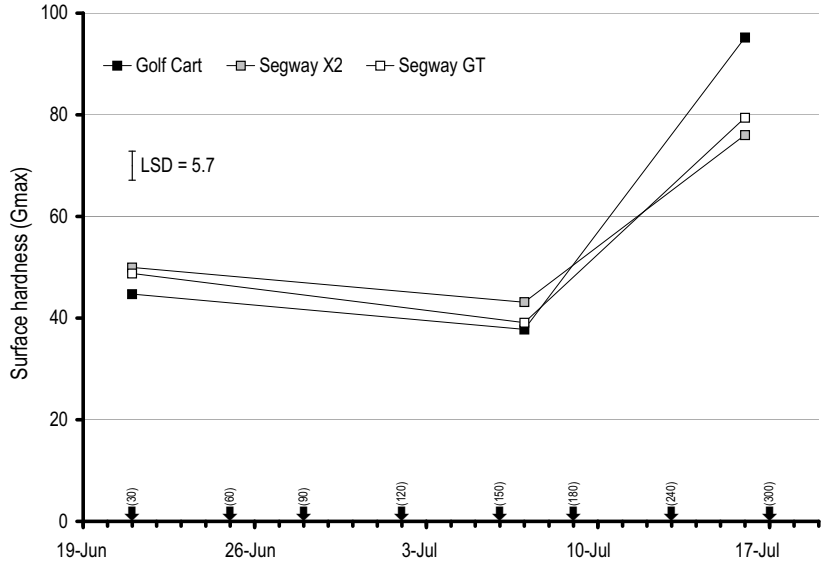

Fig. 2. Surface hardness as affected by vehicle type and evaluation date. Higher Gmax values correspond to harder surfaces. Arrows along the x-axis indicate dates of traffic application and cumulative number of passes applied. Error bar represents Fisher's least significant difference value (α = 0.05) for comparing vehicle treatments within dates.