Clipping Yield and Scalping Tendency Differ for Bermudagrass and Zoysiagrass Cultivars

Jon Trappe[1], Aaron Patton[1], and Mike Richardson[2]

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Photo by Aaron Patton

Scalping of bermudagrass research plot

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Summary. Decreased budgets as well as greater attention towards sustainability have increased interest towards reduced mowing requirements. Two growth parameters that impact mowing requirements are clipping yield and scalping tendency. The objectives of this study are to quantify the scalping tendency and clipping yield of various bermudagrass and zoysiagrass cultivars. Five bermudagrass cultivars and seven zoysiagrass cultivars were maintained under typical golf course fairway or sports field conditions to evaluate scalping tendencies and clipping yield. Patriot bermudagrass was the cultivar most prone to scalp, and in general, bermudagrass was more susceptible to scalping than zoysiagrass. Princess-77 bermudagrass produced the highest clipping yields while Cavalier, Meyer, Zorro, and Zenith zoysiagrass consistently yielded the least clippings. These results will assist turfgrass managers to select cultivars or species that potentially require less mowing and are less likely to scalp.

Abbreviations: PGR, Plant growth regulator; ZJ, *Zoysia japonica*; ZM, *Zoysia matrella*; CD, *Cynodon dactylon*; CDT, *Cynodon dactylon* × C. *transvaalensis*; C, *Cynodon* spp.; Z, *Zoysia* spp

[1] University of Arkansas, Cooperative Extension Service, Department of Horticulture, Fayetteville, Ark. 72701
[2] University of Arkansas, Department of Horticulture, Fayetteville, Ark. 72701

Advancements in turfgrass breeding have resulted in turfgrasses that recover more quickly from stresses such as divoting, wear, disease and environmental stresses such as drought or winterkill. However, species or cultivars that require less maintenance are becoming more desirable to turfgrass managers. Research providing differences in clipping yield among cultivars and species would give superintendents the ability to choose a cultivar or species that would provide a reduced need for amendments such as plant growth regulators (PGRs) and a better way to reduce clipping yield. Additionally, faster growth rates have also led to increased thatch production, which in turn has made some cultivars more prone to scalping. A particular cultivar or species that is more prone to scalping will reduce the playability, aesthetics, and overall health of a turf sward. The objectives of this study were to determine differences in scalping tendencies and clipping yields in bermudagrass (*Cynodon* spp.) and zoysiagrass (*Zoysia* spp.) cultivars.

Materials and Methods

Five cultivars of bermudagrass and seven cultivars of zoysiagrass (Table 1) were established in the summer of 2007 at the University of Arkansas Agricultural Research and Extension Center, Fayetteville, Ark. Plots were maintained under golf course fairway or sports field conditions, with a mowing height of 0.5 inches and monthly applications of 1.0 lb N/1000ft^2 for bermudagrass and 0.5 lb N/1000ft^2 for zoysiagrass during the growing season. Clipping yield was determined by collecting clippings five days after an initial mowing at 0.5 inches. Clippings were collected using a reel-type mower and bucket. Samples were weighed after four days in a dryer at 60 °C for dry weights. Diamond zoysiagrass was not fully established at the time of clipping yield collections, thus results for this cultivar will not be presented for clipping yield.

Scalping was performed during the time of clipping collection and on the same experimental plots. Scalping, removal of more than 1/3 of the turfgrass leaf, was simulated by mowing each plot after a period of 5 days without mowing. Digital images were taken immediately prior to and immediately following mowing and analyzed for percent green cover (Richardson, et al, 2001). An equation of [100*((initial green cover – post green cover)/(initial green cover))] was used to quantify the tendency of a particular plot to scalp by measuring the reduction in green coverage caused by mowing.

Results and Discussion

There were clear trends in the scalping tendencies for the cultivars evaluated. Patriot bermudagrass had significantly more scalping occur than the other 11 cultivars across the three sampling dates (Table 1). Consequently, bermudagrass consistently had significantly more scalping than zoysiagrass when analyzed across species. This may be because of Patriot's aggressive growth rate and high shoot density (Karcher et al. 2005a; Morris, 2007).

There were also clear trends in clipping yield. The cultivar that had the highest clipping yield on each sampling date was Princess-77 (Table 2). Among the zoysiagrass cultivars, Palisades and El Toro had the highest clipping yields. There were also several cultivars that had considerably lower clipping yields, including Cavalier, Meyer, Zorro, and Zenith. The clipping yield rankings of zoysiagrass cultivars were similar to previous rankings on the establishment rate, stolon growth rate, and divot recovery of zoysiagrasses (Karcher et al. 2005b; Patton et al., 2007). Species differences also existed, with bermudagrass consistently having higher clipping yields than zoysiagrass. This difference in species agrees with other work that found bermudagrass to have a faster growth rate than zoysiagrass (Beard, 1973).

Based on these findings, bermudagrass cultivars had higher clipping yields in addition to higher scalping tendencies than zoysiagrass. Some particular cultivars, such as Patriot bermudagrass, had higher clipping yields and also had a higher scalping tendency, while other cultivars that also had high clipping yields did not have a

high scalping tendency. There is more work needed to investigate the mechanisms behind scalping and its potential relationship with high clipping yield. These results will assist turfgrass managers to select cultivars or species that potentially require less mowing and are less likely to scalp. They will not only help to improve playing conditions, but will also help to reduce PGR use, equipment wear, labor and fuel costs associated with maintaining a golf course fairway or sports field. These studies will be repeated again in 2009.

Literature Cited

Beard, J.B. 1973. Turfgrass science and culture. Prentice Hall, Inc., Englewood Cliffs, N.J.

Karcher, D.E., M.D. Richardson, J.W. Landreth, and J.H. McCalla, Jr. 2005a. Recovery of bermudagrass varieties from divot injury. Online. Applied Turfgrass Science. doi:10.1094/ATS-2005-0117-01-RS.

Karcher, D.E., M.D. Richardson, J.W. Landreth, and J.H. McCalla, Jr. 2005b. Recovery of zoysiagrass varieties from divot injury. Online. Applied Turfgrass Science. doi:10.1094/ATS-2005-0117-01-RS.

Morris, K. 2007. 2002 Bermudagrass Trial. NTEP No. 07-10. USDA, Beltsville, Md.

Patton, A.J., J.J. Volenec, and Z.J. Reicher. 2007. Stolon growth and dry matter partitioning explains differences in zoysiagrass establishment rates. Crop Sci. 47:1237-1245.

Richardson, M.D., D.E. Karcher, and L.C. Purcell. 2001. Quantifying turfgrass cover using digital image analysis. Crop Sci. 41:1884-1888.

Table 1. Percent scalping tendency across three dates for various bermudagrass and zoysiagrass cultivars.

Cultivar	Species	Scalping[z]		
		4 Aug.	28 Aug.	23 Sept.
		----------%----------		
Cavalier	ZM[y]	0.0 b[x]	0.3 b	0.1 b
Diamond	ZM	0.2 b	0.1 b	0.0 b
El Toro	ZJ	0.1 b	0.5 b	0.7 b
Meyer	ZJ	0.3 b	0.0 b	0.3 b
Palisades	ZJ	0.0 b	0.1 b	0.4 b
Patriot	CDT	0.8 a	2.4 a	15.6 a
Princess-77	CDT	0.1 b	0.4 b	0.3 b
Riviera	CD	0.1 b	0.5 b	0.4 b
Tifsport	CDT	0.2 b	0.4 b	1.4 b
Tifway	CDT	0.3 b	0.2 b	7.2 b
Zenith	ZM	0.1 b	0.0 b	0.3 b
Zorro	ZM	0.0 b	0.0 b	0.1 b
Species				
Bermuda	C	0.3	0.8 a	5.0 a
Zoysia	Z	0.1	0.1 b	0.2 b

[z] Scalping tendency expressed as a percent using the equation [100*(initial green cover – post green cover)/(initial green cover)].

[y] ZJ = *Zoysia japonica*; ZM = *Zoysia matrella*; CD = *Cynodon dactylon*; CDT = *Cynodon dactylon* × *C. transvaalensis*; C = *Cynodon* spp.; Z = *Zoysia* spp.

[x] Values in a column followed by the same letter are not significantly different from another (LSD, α = 0.05).

Table 2. Fresh and dry weight clipping yield of various bermudagrass and zoysiagrass cultivars.

Cultivar	Species	Clipping yield[z]		
		4 Aug.	28 Aug.	23 Sept.
		----------g/m^2----------		
Cavalier	ZM[y]	1.8 ef[x]	2.3 cd	3.3 abc
El Toro	ZJ	3.5 d	3.4 b	3.8 ab
Meyer	ZJ	0.8 f	2.0 d	3.0 bc
Palisades	ZJ	6.0 c	3.5 b	4.0 ab
Patriot	CDT	7.6 ab	3.5 b	3.2 abc
Princess-77	CDT	8.6 a	4.6 a	4.3 a
Riviera	CD	6.6 bc	3.8 ab	3.3 abc
Tifsport	CDT	5.8 c	3.6 b	3.4 abc
Tifway	CDT	6.9 bc	3.7 ab	2.8 c
Zenith	ZM	2.7 de	3.0 bc	3.4 abc
Zorro	ZM	1.4 ef	2.5 cd	3.7 abc
Species				
Bermuda	C	7.1 a	3.8 a	3.4
Zoysia	Z	2.7 b	2.8 b	3.6

[z] Clipping yield of cultivars expressed as weight per unit area.
[y] ZJ = *Zoysia japonica*; ZM = *Zoysia matrella*; CD = *Cynodon dactylon*; CDT = *Cynodon dactylon* × *C. transvaalensis*; C = *Cynodon* spp.; Z = *Zoysia* spp.
[x] Values in a column followed by the same letter are not significantly different from another (LSD, α = 0.05).