Clipping Yield and Scalping Tendency of Bermudagrass and Zoysiagrass Cultivars – Year 2

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

Additional index words: Cavalier, Diamond, El Toro, Meyer, mowing, Palisades, Patriot, PGR, Princess-77, Riviera, Tifsport, Tifway, Zenith, and Zorro

Trappe, J., A. Patton, D. Karcher, and M. Richardson. 2010. Clipping yield and scalping tendency of bermudagrass and zoysiagrass cultivars–year 2. Arkansas Turfgrass Report 2009, Ark. Ag. Exp. Stn. Res. Ser. 579:91-94.

Photo by David Stone

Meyer zoysiagrass fairway mown after several days of growth.

Summary. Bermudagrass and zoysiagrass are two of the most commonly used turfgrass species on golf course fairways and tees in the southern U.S. However, there are few reports comparing commonly used cultivars of bermudagrass to commonly used cultivars of zoysiagrass. Because clipping yield and scalping tendency are important management characteristics of fairways and tees, research was performed on these characteristics among commonly used bermudagrass and zoysiagrass cultivars. Clipping yield and scalping tendency were evaluated on five cultivars of bermudagrass and seven cultivars of zoysiagrass. The cultivars producing the lowest amount of clippings were Diamond and Meyer zoysiagrass, while Tifsport and Tifway bermudagrass, and El Toro, Zenith, Zorro, and Palisades zoysiagrass had the highest amount of clippings. Patriot and Tifsport bermudagrass had the highest scalping tendency. These results will assist golf course managers in selecting cultivars of bermudagrass and zoysiagrass for golf course fairways or tees that produce few clippings and scalp infrequently.

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

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

Bermudagrass (*Cynodon* spp.) and zoysiagrass (*Zoysia* spp.) are the predominant turfgrass species used on golf course fairways and tees in Arkansas. Species or cultivars that require less maintenance, such as reduced mowing frequency, are becoming more desirable to turfgrass managers. Research documenting differences in clipping yield among cultivars and species would allow superintendents the ability to choose a cultivar that could provide a reduced frequency for mowing and possibly reduce of the need for plant growth regulators (PGRs). However, more research is needed comparing mowing characteristics for commonly used cultivars of bermudagrass and zoysiagrass.

Scalping has been defined as "the removal of an excessive quantity of green shoots from a turf at any one mowing that result in a stubby, brown appearance due to the exposed stems, stolons, and dead lower leaves" (Beard and Beard, 2005). While Beard and Beard (2005) cite the aesthetic damage scalping causes to a turfgrass sward, it can also affect plant health (Oswalt et al., 1953; Reynolds and Smith, 1962; Biran and Bushkin-Harav, 1981). Another negative aspect of scalping is that it can thin turf and potentially affect the playability of the turfgrass area. A particular cultivar or species that is more prone to scalping will reduce the playability, aesthetics, and overall health of a turf sward. In addition to excessive thatch accumulation, other potential causes of scalping may include mower adjustment errors, infrequent mowing, or an uneven soil surface. The objectives of this research were to determine/evaluate the clipping yield and scalping tendency for bermudagrass and zoysiagrass 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. Plots were maintained under golf course fairway conditions, with a mowing height of 0.5 inch 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 dried for four days in a dryer at 60 °C for dry weight determination.

Scalping was performed during the time of clipping collection and on the same experimental plots. Scalping, 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

Differences in clipping yield existed among cultivars and species of bermudagrass and zoysiagrass (Table 1). Cultivars with the highest clipping yields on 4 June and 31 August were El Toro, Palisades, Zenith and Zorro zoysiagrass and those cultivars with the lowest clipping yields were Patriot, Princess 77, Tifsport, and Tifway bermudagrass. On 13 July, Tifway and Tifsport bermudagrass produced the highest clipping yields, whereas Meyer zoysiagrass had the lowest clipping yield. *Zoysia* spp. produced more clippings than *C. dactylon* × *C. transvaalensis* (hybrid bermudagrass) in early summer (4 June), but *Z. matrella* produced similar clipping yields to *C. dactylon* (common bermudagrass). In late summer (31 August), *Zoysia* spp. yielded more clippings than *Cynodon* spp., while *Cynodon* spp. yielded greater clippings in the middle of summer (13 July). *Cynodon dactylon* and *C. dactylon* × *C. transvaalensis* had similar clipping yields throughout 2009.

Based upon 2009 results, the cultivars consistently producing the lowest clipping yields were Diamond and Meyer zoysiagrass. Conversely, the cultivars producing the highest clipping yields, Tifsport and Tifway bermudagrass and Palisades, El Toro, Zenith, and Zorro zoysiagrass, should be avoided if reduced mowing frequency is desired.

Although there were differences in clipping yield among cultivars of bermudagrass and zoysiagrass, this evaluation does not provide estimates for mowing frequency or leaf extension rate. In particular, these results do not provide turf managers with specific mowing requirements or growth rates that might affect management or playability characteristics.

Differences existed among bermudagrass and zoysiagrass cultivars for scalping on one of the three collection dates (Table 2). Differences in scalping among cultivars existed on 31 August but not on 6 June or 13 July. Patriot and Tifsport bermudagrass were more prone to scalping than other cultivars. *Cynodon dactylon* × *C. transvaalensis* consistently had more scalping than all other species, but this was heavily influenced by Patriot and Tifsport.

Zoysiagrasses in general are less likely to scalp because of their canopy structure and increased chlorophyll content in lower leaves compared to bermudagrass (Biran and Bushkin-Harav, 1981). Field and greenhouse observations suggest that zoysiagrasses produce more leaves lower in the canopy than bermudagrasses, making the actively growing part of the plant less exposed to scalping. This theory is supported by the work of Biran and Bushkin-Harav (1981) and may explain why bermudagrass cultivars such as Patriot and Tifway are more prone to scalping.

The range for scalping tendency for all cultivars across all dates was from 0 to 13%. While there were statistical differences between cultivars and species, it is unclear how much of an increase in scalping tendency will affect playability, overall plant health, or what percentage scalping is considered tolerable by most golf course superintendents. Future research should be performed to identify the effect of scalping on playability and overall plant health in warm-season turf. Based on these results, turfgrass managers concerned with scalping tendency of their playing surface should avoid planting Patriot and Tifsport bermudagrass, increase mowing frequency in late summer, or perhaps apply trinexapac-ethyl to reduce scalping (Fagerness et al., 2001).

Conclusions

The cultivars with the lowest clipping yield were Diamond and Meyer zoysiagrass. Patriot and Tifsport bermudagrass had the highest scalping tendency across multiple evaluation dates. These results will assist golf course managers in selecting cultivars of bermudagrass and zoysiagrass that have low clipping yields and scalping tendencies for golf course fairways or tees. Selecting a cultivar with low clipping yield and scalping tendency will not only help to improve playing conditions, but will also help to reduce PGR use, equipment wear, and labor and fuel costs associated with maintaining a golf course fairway or sports field.

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Table 1. Clipping yield dry weight means across three dates in 2009 for various bermudagrass and zoysiagrass cultivars in Fayetteville, Ark.

Cultivar	Species	4 Jun	13 Jul	31 Aug
		----------g m^{-2} d^{-1}[z]----------		
Cavalier	ZM[y]	8.7 cd[x]	18.6 cd	10.9 a
Diamond	ZM	7.2 de	14.1 de	6.3 d
El Toro	ZJ	12.6 a	18.4 cd	10.3 ab
Meyer	ZJ	8.6 cd	8.7 f	8.5 bc
Palisades	ZJ	11.2 ab	19.5 c	11.2 a
Patriot	CDCT	5.8 ef	20.8 cd	6.1 d
Princess 77	CD	3.9 f	21.3 bc	6.5 d
Riviera	CD	10.1 bc	18.5 cd	5.3 d
Tifsport	CDCT	5.6 ef	25.2 ab	6.6 cd
Tifway	CDCT	5.4 ef	28.0 a	4.8 d
Zenith	ZJ	10.6 abc	13.6 e	9.5 ab
Zorro	ZM	10.5 abc	19.4 c	10.6 a

[z] Clipping yield of cultivars expressed as weight per unit area.

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

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

Table 2. Scalping tendency for five bermudagrass and seven zoysiagrass cultivars in Fayetteville, Ark. in 2009.

Cultivar	Species	4 Jun	13 Jul	31 Aug
		----------%[z]----------		
Cavalier	ZM[y]	2.0[x]	0.3	0.0 b
Diamond	ZM	2.8	0.7	0.0 b
El Toro	ZJ	2.7	0.0	0.0 b
Meyer	ZJ	11.0	0.2	0.0 b
Palisades	ZJ	1.8	1.3	0.0 b
Patriot	CDCT	1.8	0.0	13.3 a
Princess 77	CD	6.2	0.1	1.2 b
Riviera	CD	5.8	0.0	0.1 b
Tifsport	CDCT	0.1	0.7	12.0 a
Tifway	CDCT	6.4	0.8	0.3 b
Zenith	ZJ	1.6	0.2	0.0 b
Zorro	ZM	3.8	0.5	0.0 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*; CDCT = *Cynodon dactylon* × *C. transvaalensis*.

[x] Values in a column followed by the same letter are not significantly different (LSD, α = 0.05). On dates where letters do not follow means, all treatments were similar.