EVALUATION OF ROOTZONE MIXTURES FOR TRAFFICKED BERMUDAGRASS 'TIFWAY' SPORTS TURF.

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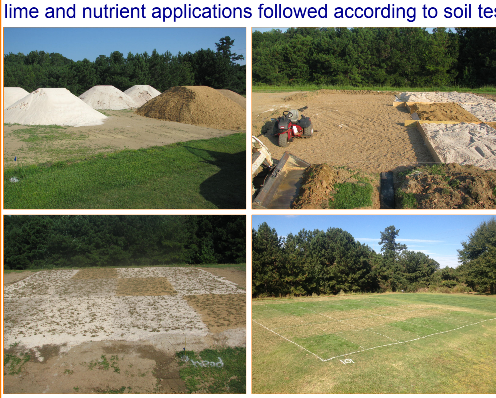
INTRODUCTION

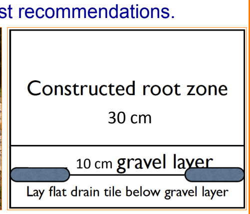
Sports fields should provide adequate playability, allowing for successful and uninhibited execution of a sporting event. Sports fields are often constructed using sand-based rootzone materials, however, differently from golf, a standard construction method similar to the "USGA Recommendations for a Method of Putting Green Construction" has yet to be developed. Research was conducted at Auburn University to investigate aesthetics and playability parameters and their interaction with wear for 'Tifway' bermudagrass (*Cynodon dactylon* L. Pers. x *C. transvaalensis* Burtt-Davey) sports turf establish in four different sand-based constructed rootzones.

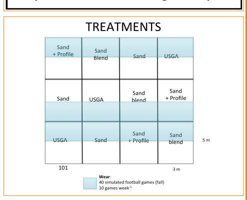
MATERIALS AND METHODS

1. Site construction

Field plots were constructed in July 2011 on an area 12 x 14 m laser-graded to a 0.75% slope. After placing geotextile cloth on the graded area, 4 flat, panel-shaped drain pipes spaced 3 m were installed, and a 10 cm layer of washed pea gravel was added, maintaining the original slope. Following the drainage system, a 30 cm layer of the four rootzone mixtures was added. Rootzone plots were 3 x 5 m and replicated 3 times in a RCB design. Pure sand, USGA sand (90-10, sand-peat moss v/v), sand + Profile™ porous ceramic (90-10 v/v), and a blend of lawn sand + concrete sand + mason sand (20-40-40 v/v) were the rootzone materials used. Before sprigging with Tifway bermudagrass, the area was leveled to the subgrade several times while undergoing successive cycles of water soaking/drying to help with rootzone consolidation. Tifway bermudagrass was sprigged on 24 Aug 2011 at 43 ton ha^{-1}, and plots underwent an establishment/consolidation period of one year. During this period, lime and nutrient applications followed according to soil test recommendations.







2. Treatments and data collection

Research was conducted at the Auburn University Turfgrass Research and Education Center, in Auburn, AL, in 2012-13 and 2013-14 to evaluate the effect of constructed sand-based rootzones and their interaction with wear on Tifway bermudagrass sports turf. A Cady Traffic Simulator was used to apply 40 simulated football games from October through December in 2012 and 2013. Data collection followed during the fall and spring of the following year. Turfgrass cover, turfgrass quality (TQ), turf shear strength, surface hardness, and soil water content over time following water saturation were measured. Data were analyzed in SAS (SAS Institute Inc. Carry, NC), and means were separated via ANOVA, using Fisher's protected test at α = 0.05 level.

RESULTS:

Turfgrass aesthetic parameters were mostly influenced by simulated wear (Table 1). Intensive simulated wear during the fall reduced turfgrass cover in the fall through the following spring, whereas TQ was only reduced during the wear simulation period. Differences in playability parameters were found only in the 2013-14 season (Table 2). Shear strength of wear-free plots was not affected by soil type during the fall, however, sand + Profile™ porous ceramic resulted in less traction (39 N m) compared to the other rootzone types in the following spring. Under simulated wear, USGA sand resulted in greater traction in November (following wear simulation) (32 N m), and April (50 N m), during spring green-up. Surface hardness was affected only in November, and the sand blend consisting of lawn sand + mason sand + concrete sand resulted in the hardest surface (95 N m), likely because its greater surface hardness even without simulated wear (82 N m). Sand + Profile™ porous ceramic was the softest turf surface for both wear and non-wear plots (74 – 79 N m). Without simulated wear, USGA sand was amongst the rootzone types with greater hardness values (81 N m), whereas under simulated wear, it resulted in intermediate surface hardness (88 N m). This could be attributed to more remaining turfgrass and roots in wear-free plots, which decreases sand displacement, resulting in a firmer surface (van Wijk and Beuving, 1980).

Table 1. Aesthetic parameters influenced by wear during fall and the following spring, in 2012-13 and 2013-14, in Auburn, AL.

	------------ Turfgrass cover (%) ------------	
Treatment	November	April
No wear	89 a[§]	95 a
Simulated wear[¥]	76 b	83 b
P value	10.6	8.0
LSD (0.05)	0.0386	0.0052
	------------ TQ (1-9) ------------	
Treatment	November	April
No wear	6 a	7 a
Simulated wear	5 b	7 a
P value	0.049	NS
LSD (0.05)	1	0.4

[¥]Game simulation used a Cady Traffic Simulator (CTS) to simulate a total of 40 games from September to November in 2012 and 2013, in Auburn, AL.
[#]NS, not significant at the α = 0.05 level.
[§]Within the same column, means sharing a common letter for each parameter are not significantly different according to Fisher's protected test at α = 0.05 level.

Table 2. Playability parameters influenced by rootzone type during fall and the following spring, 2013-14, in Auburn, AL.

	---------- Turf shear strength (N m) ----------			
	No wear		Simulated wear[¥]	
Rootzone type	November 2013	April 2014	November 2013	April 2014
Pure sand	33 a	44 a	29 b	48 ab
USGA sand	33 a	42 a	32 a	50 a
Sand + Profile™	32 a	39 b	29 b	47 bc
Native sand blend	32 a	44 a	30 ab	46 c
P value	NS	< 0.0001	0.0453	0.0056
LDS (0.05)	1.4	2.2	2.1	2.6
	---------- Surface hardness (G_{max}) ----------			
	No wear		Simulated wear	
Treatment	November 2013	April 2014	November 2013	April 2014
Pure sand	76 ab	76 a	90 ab	83 a
USGA sand	81 a	74 a	88 b	81 a
Sand + Profile™	74 b	70 a	79 c	74 a
Native sand blend	82 a	73 a	95 a	78 a
P value	0.0295	NS	0.0002	NS
LDS (0.05)	6	7	7	8

[¥]Game simulation used a Cady Traffic Simulator (CTS) to simulate a total of 40 games from September to November in 2012 and 2013, in Auburn, AL.
[#]NS, not significant at the α = 0.05 level.
[§]Within the same column, means sharing a common letter for each parameter are not significantly different according to Fisher's protected test at α = 0.05 level.

Rootzone type ultimately affected soil water content. Figures 1(ab) and 2(ab) show soil volumetric water content throughout the day after a soil saturating rain event. The 3-way sand blend resulted in greater water content throughout the day in 2013 and 2014. Furthermore, simulated wear amplified soil moisture differences between cultivars for both years. Soil moisture rankings according to rootzone type was: lawn sand + mason sand + concrete sand blend > sand + Profile™ porous ceramic > USGA sand > pure sand.

Figure 1.
- Soil volumetric water content over time.
- 19 August 2013.
- Measured every 2 hours with a hand-held moisture probe FieldScout TDR 300 (Spectrum Technologies Inc. Aurora, IL).
- 3 subsamples.

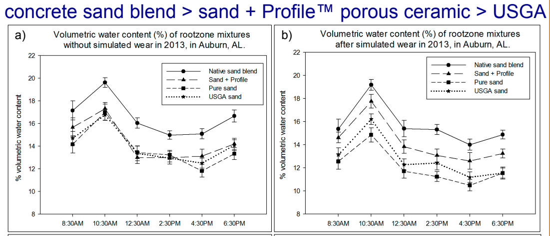
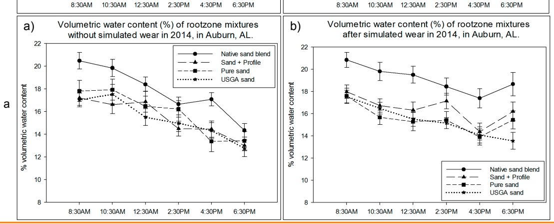


Figure 2.
- Soil volumetric water content over time.
- 18 March 2014.
- Measured every 2 hours with a hand-held moisture probe FieldScout TDR 300 (Spectrum Technologies Inc. Aurora, IL).
- 3 subsamples.



CONCLUSION AND FURTHER RESEARCH

Different sand-based rootzone types greatly affected soil moisture, especially when turf was submitted to simulated wear. Future research should focus on drainage and soil/water relationships, as well as soil physical properties of trafficked sports fields.