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Effects of Finer-Textured Topdressing Sand on Creeping Bentgrass Putting Green Turf

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- Core cultivation treatments were initiated in May 2016 on a 20-month-old 'Shark' creeping bentgrass (*Agrostis stolonifera*) turf maintained as a putting green turf; topdressing treatments were initiated in June.
- Turf responses to topdressing and cultivation were evident during the first year of this trial.
- Turf quality was better when topdressing was applied, regardless of sand size and rate, compared to non-topdressed controls.
- Turf quality was acceptable on all plots but slightly poorer on cored plots compared to non-cored plots throughout most of 2016.
- Volumetric water content at the 0- to 38-mm surface depth zone was reduced by both topdressing and cultivation, with cultivation having a more pronounced effect.

This project is evaluating the effect of topdressing sand size on the playability and physical properties of a sand-based putting green turf. Specific objectives include determining the effects of (i) eliminating coarse particles from topdressing sand (subsequently increasing the quantities of medium, fine and very fine particles) and (ii) core cultivation (plus backfilling holes with medium-coarse sand) on turf performance and the physical properties at the surface of a 'Shark' creeping bentgrass (*Agrostis stolonifera*) turf.

This trial used a 3 x 2 x 2 factorially arranged randomized complete block design with four replications and was initiated on a ~20-month-old turf in May 2016. The factors include sand size (medium-coarse, medium-fine, fine-medium), rate of midseason topdressing (50 and 100 lbs. per 1,000 sq. ft. every 2 weeks), and cultivation (cored plus backfill or non-cored). A non-topdressed control at both levels of cultivation were included for orthogonal comparisons resulting in 14 total treatments (Table 1). The medium-coarse sand meet USGA recommendations for putting green construction; whereas the medium-fine and fine-medium sands contain little to no coarse particles and the fraction of fine sand exceeded USGA recommendations (Table 2).

Forty-five core samples (25-mm diam.) were collected in May to characterize the initial thatch-mat depth and organic matter concentration before treatment initiation. Turf quality was visually rated June through October. Additionally, a mild algae outbreak in late September and residual sand on the surface of plots after topdressing were rated. Sand and clippings collected in the mower basket were sampled from each plot three times during 2016 to determine sand weight and particle size distribution. Initial surface firmness and hardness were assessed along with volumetric water content of the surface 0- to 38-mm depth zone.

Analysis and interpretation of this first-year data is ongoing; however, initial assessments indicate that turf performance and surface wetness were affected by topdressing and core cultivation treatments. Topdressing (pooled over all treatments) improved turf quality on 13 out of 15 rating dates compared to non-topdressed plots (Fig. 1). Core cultivation in May 2016 subtly reduced turf quality compared to non-cored plots throughout most of 2016; however, turf quality of core cultivated plots was acceptable (Fig. 2). Similarly, turf density was greater in topdressed plots compared to non-topdressed plots on 14 of 15 rating dates during 2016 (data not shown). Topdressing applied at 100 lbs.

per 1,000 sq. ft. every 2 weeks increased turf density compared to 50 lbs. per 1,000 sq. ft. on 6 of 15 rating dates in 2016. Core cultivation reduced turf density compared to non-cored plots throughout much of 2016.

Topdressing (pooled over all treatments) reduced volumetric water content at the 0- to 38-mm depth zone compared to non-topdressed plots on 13 out of 31 dates during 2016 (Fig 3.). Moreover, volumetric water content in this zone was greater in plots topdressed with fine-medium sand compared to medium-fine and medium-coarse sands (data not shown). Core cultivation in the spring of 2016 decreased volumetric water content throughout the year (31 dates) compared to non-cultivated plots during 2016 (Fig. 4).

Table 1. Summary of the individual treatment combinations of topdressing (sand size and rate) and cultivation as well as two controls (no topdressing during the growing season) being evaluated on 'Shark' creeping bentgrass grown on a sand-based rootzone.

	Factors in the Experiment			
Treatment No.	Sand Size†	Topdressing Sand Rate during the Growing Season‡	Cultivation¶	Annual Quantity of Sand Applied
		lbs. / 1,000 sq. ft.		lbs. / 1,000 sq. ft.
1	Medium-coarse	50	Non-cored	1,200
2	Medium-coarse	50	Core + Backfill	1,700
3	Medium-coarse	100	Non-cored	1,700
4	Medium-coarse	100	Core + Backfill	2,200
5	Medium-fine	50	Non-cored	1,200
6	Medium-fine	50	Core + Backfill	1,700
7	Medium-fine	100	Non-cored	1,700
8	Medium-fine	100	Core + Backfill	2,200
9	Fine-medium	50	Non-cored	1,200
10	Fine-medium	50	Core + Backfill	1,700
11	Fine-medium	100	Non-cored	1,700
12	Fine-medium	100	Core + Backfill	2,200
13	None	0	Non-cored	0
14	None	0	Core + Backfill	1,200

†, First-mentioned size class represent the predominant size fraction in the sand.

‡, Topdressing applied every two weeks from 10 June through 12 October (10 applications). Topdressing at 50 lbs. per 1,000 sq. ft. represented a 'dusting' quantity (O'Brien and Hartwiger, 2003); whereas, topdressing at 100 lbs. filled the surface thatch and lower verdure layers.

¶, Core cultivation to the 1 ½-in depth was performed twice a year (10 May and 2 November) using ½-inch diameter hollow tines spaced to remove 10% of the plot surface area annually. Coring holes were backfilled with 600 lbs. per 1,000 sq. ft. of medium-coarse sand. Non-cored plots were topdressed with the respective sand size at 400 and 300 lbs. per 1,000 sq. ft. in May and October, respectively, to fill the surface thatch and verdure layers to the same extent as backfilled, cored plots.

Table 2. Particle size distribution of sands used to topdress plots on a 'Shark' creeping bentgrass grown on a sand-based rootzone.

Sand	1000 µm Very Coarse	500 µm Coarse	250 µm Medium	150 µm Fine	53 µm Very Fine
	------------------------------ % (by weight) retained -----------------------------				
Medium-coarse	0	33.8	57.7	8.4	0.1
Medium-fine	0	0.1	76.7	22.7	0.5
Fine-medium	0	5.7	25.8	66.8	1.7

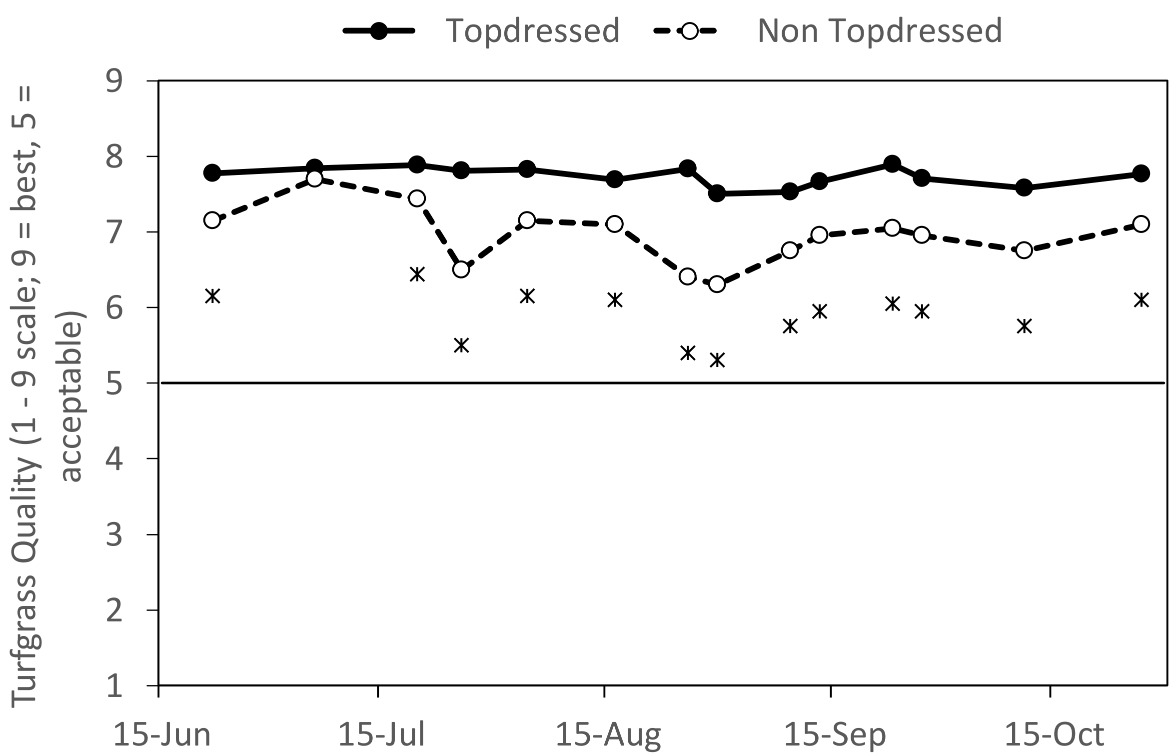

Figure 1. Effect of topdressing (pooled over all treatment levels) compared to non-topdressed plots on turf quality of a 'Shark' creeping bentgrass turf maintained at 2.8-mm in North Brunswick, NJ during 2016.

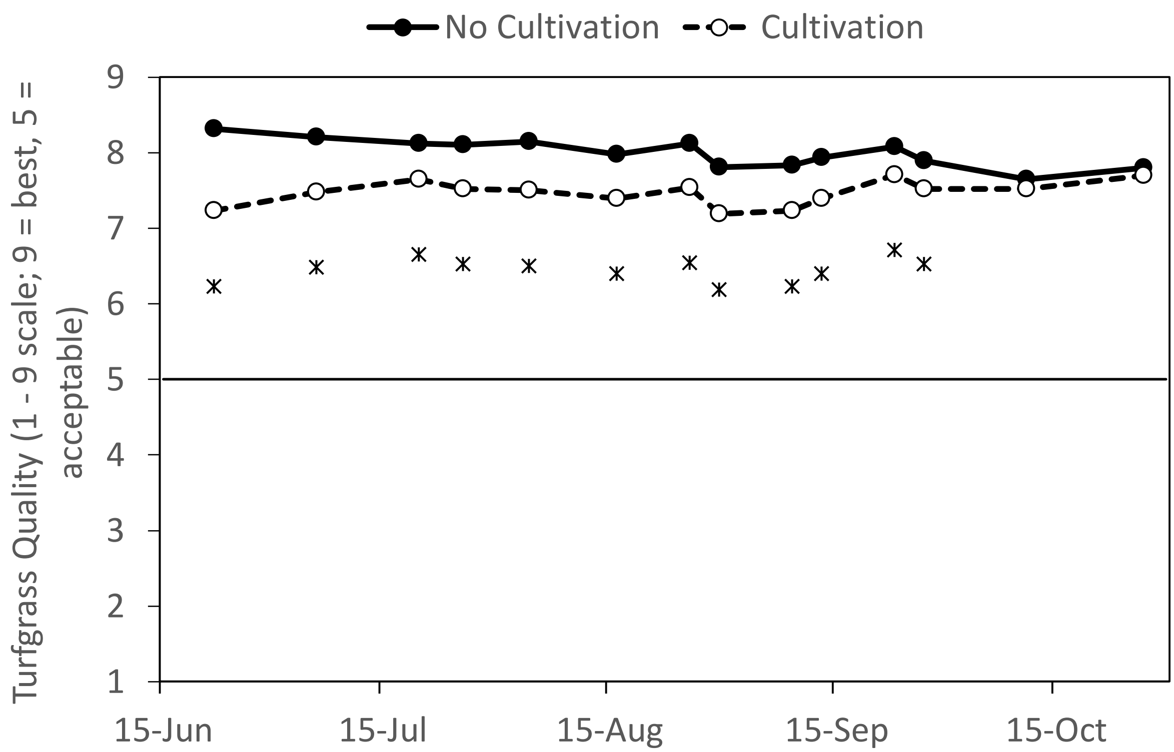

Figure 2. Effect of core cultivation on turfgrass quality of a 'Shark' creeping bentgrass turf maintained at 2.8-mm in North Brunswick, NJ during 2016.

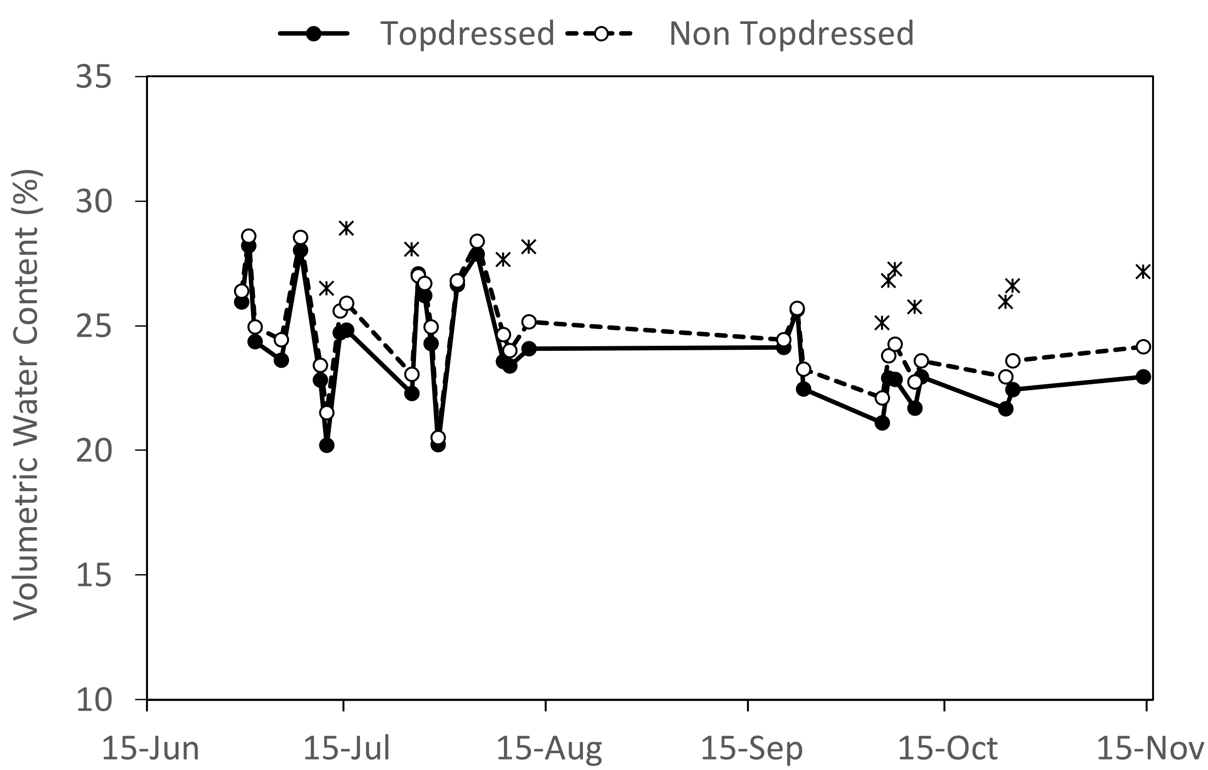

Figure 3. Effect of topdressing (pooled over all treatment levels) compared to non-topdressed plots on volumetric water content of the 0- to 38-mm surface depth zone of a 'Shark' creeping bentgrass turf maintained at 2.8-mm in North Brunswick, NJ during 2016.

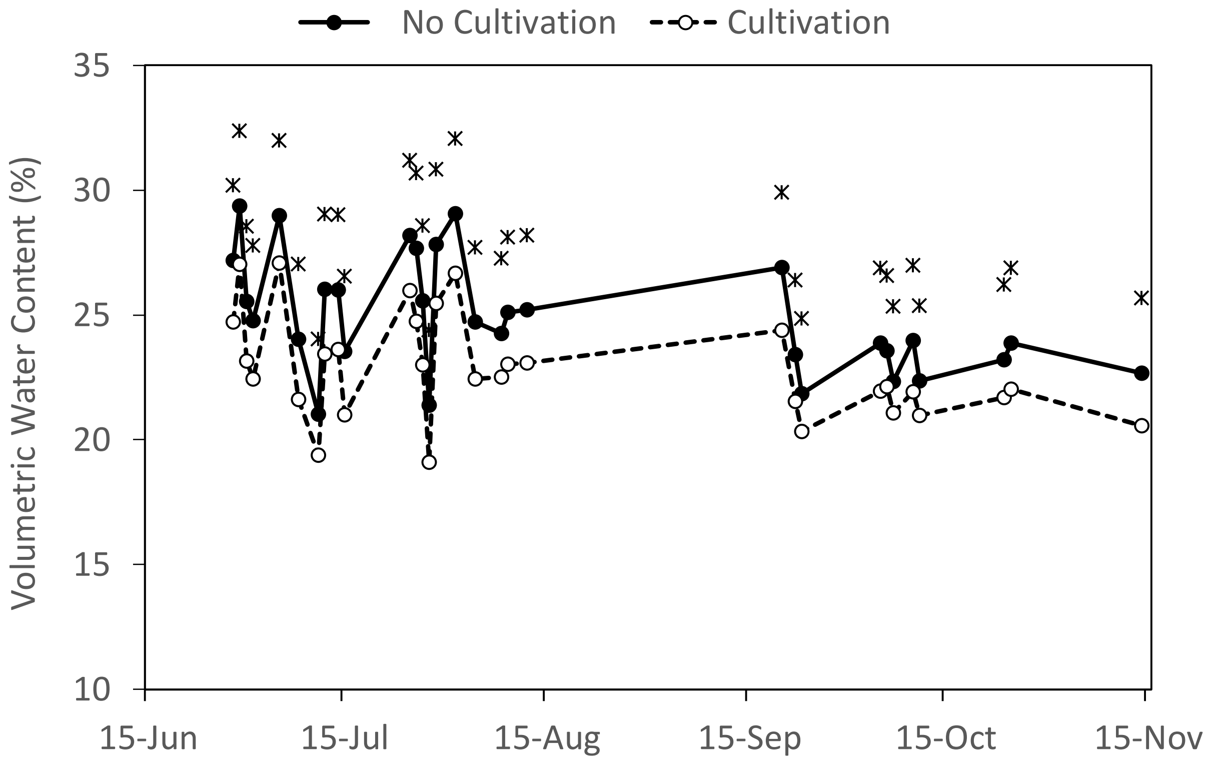

Figure 4. Effect of core cultivation on volumetric water content at the 0- to 38-mm surface depth zone of a 'Shark' creeping bentgrass turf maintained at 2.8-mm in North Brunswick, NJ during 2016.