



Mavis Consulting, Ltd Newsletter

Turf & Soil Fertility Specialist

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How Effective is Your Sand Top-dressing Program?

Should greens be top-dressed with very coarse (1 mm) or even coarse sand particles (0.5 mm) during regular top-dressing? Ideally sand based greens would be top-dressed with the same sand utilized for construction (as long as it is desirable), but the trend in the industry seems to be going towards top-dressing with a finer sand unless aerating prior to application. The finer sand may result in less surface disruption and mower wear, but is it going to produce a desirable root-zone as it accumulates in the profile? Top-dressing with a finer material than what the root-zone is composed of, may result in significant turf loss. This also applies to those soil based greens that have been top-dressed for years and contain a 2-3" layer of nearly pure sand. It is unknown whether or not there will be negative consequences for top-dressing with a finer sand throughout the year and filling aeration holes with a coarser sand when aerating only.

Purpose of Study:

To determine what sand particles are being removed when mowing and how much is being removed when utilizing a medium to coarse USGA top-dressing sand

Procedure:

Sample Collection

1. collect all clippings from mower buckets after each mowing for 4 days after top-dressing (example: top-dress greens Monday, collect clippings Tuesday through Friday)
2. place all clippings from one day into clean loader bucket
3. fill bucket with water so that clippings float and sand sinks
4. gradually tip loader bucket until only clippings fall out
 - a. repeat until little to no clippings remain in sand
 - b. may work best if stir end of hose into the sand to increase clipping removal
5. dump excess water when only sand is left and no tissues float
6. allow sand to dry in loader bucket if possible before dumping/ piling on clean surface inside

Sample Measuring:

1. Each pile of sand was weighed in 5 gallon increments with partial 5 gallon quantities calculated by average pile weight
2. Each pile of sand was thoroughly mixed and divided until a 1 gallon sample remained according to USGA guidelines for quality control sampling (http://www.usga.org/course_care/articles/construction/greens/Quality-Control-Sampling-of-Sand-and-Rootzone-Mixture-Stockpiles/)
3. Sample was submitted to Brookside Laboratories, Inc (USGA/A2LA Accredited) for testing

Results:

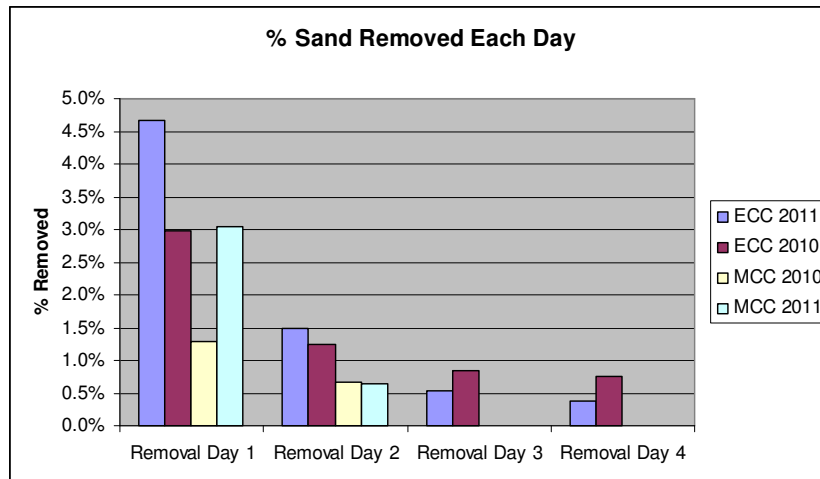
Sand Quantity Measurements: Two different top-dressing sands and golf courses were utilized to conduct the research. Both courses Elcona Country Club and Meadowbrook Country Club utilize similar top-dressing sands (medium to coarse USGA sand). These top-dressing sands are identified in Tables 4 and 5 as Country Stone and Osburn HP.

The on-site (non laboratory) measurements indicate that after four mowings 5.8 - 7% of the sand applied had been removed. Two mowings resulted in 1.9 – 6.1% removed and the first mowing removed 1.2 - 4.6% of the sand applied. See Table 1. for data and variable cultural practices. This indicates that **at least 93% of the sand applied is not being picked up** by the mowers within 4 mowings after the sand is applied. The majority of the sand is removed within the first two mowings and there is most likely minimal removal beyond the fourth mowing.

Table 1.

Golf Course	Elcona CC-2011	Elcona CC-2010	Meadowbrook CC - 2010	Meadowbrook CC - 2011
mowing height	0.115	0.115	0.12	0.12
sand source	Country Stone	Country Stone	Osburn, HP	Osburn, HP
total yards applied	4.0	4.0	7.3	7.3
square footage of greens	95741	95741	110000	110000
mower	Toro 1000	Toro 1000	Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)
top-dresser	Dakota 410	Dakota 410	Turfco sp1530	Turfco sp1530
turf type	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass
mowing 1 (gallons)	37.700	24.000	19	45
yards ³	0.187	0.119	0.094	0.223
mowing 2 (gallons)	12.160	10.160	9.6	9.56
yards ³	0.060	0.050	0.048	0.047
mowing 3 (gallons)	4.150	6.900		
yards ³	0.021	0.034		
mowing 4 (gallons)	3.090	6.150		
yards ³	0.015	0.030		
mowing 5 (gallons)				
yards ³				
Total Gallons	57.100	47.210	28.600	54.560
Total Yards	0.283	0.234	0.142	0.270
% removed	7.07%	5.84%	1.94%	3.70%
Cultural practices before	mow	mow	single verti-cut	single verti-cut 1/16"
Cultural practices after	drag w/ coco mat water 10 min mow daily roll 5 days / week not rolled until two days after TD	drag w/ coco mat water 10 min mow daily roll 5 days / week not rolled until two days after TD	brushed rosebud in backpack blow rolled (speed roller) *both mowings same day TD	brushed backpack blow rosebud in rolled (speed roller) first mowing was next day
Thanks to	Greg Shaffer, Cody	Greg Shaffer, Wade	Mike Edgerton, Brian Hilfinger	Mike Edgerton, Andy O'Haver

Table 1a.



Sand Lab Measurements: Partial Physical Analysis (USGA/A2LA Accredited) including: sand, silt, clay, organic matter percentages and sand particle sieving was run by Brookside Laboratories on a sample of sand after each mowing. The laboratory test results indicate that **more than half** (60-70%) of the very coarse sand (1 mm) is not being removed within 4 mowings and that **only 13%** of the Coarse Sand particles are being removed after 4 mowings. See Tables 2, 3 and 4 for further details.

Table 2.

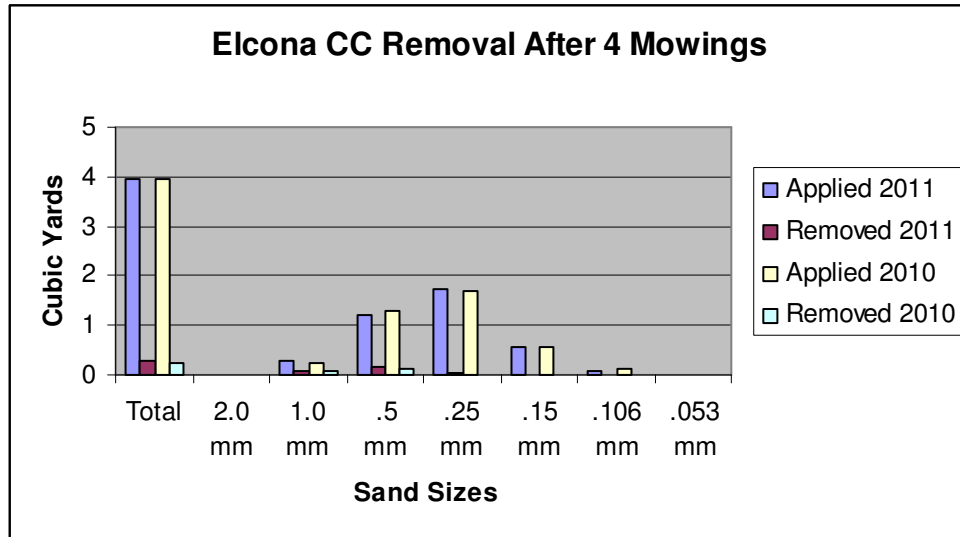


Table 3.

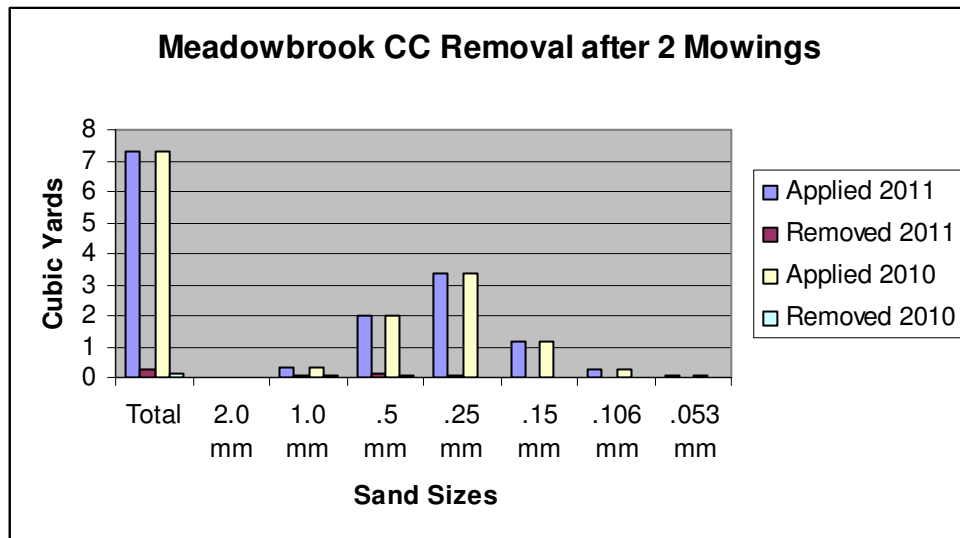


Table 4.

Sample ID:		C.Stone	ECC	ECC	ECC	ECC			Os. HP	MCC	MCC				
Mix		100%	1st Mow	2nd Mow	3rd Mow	4th Mow			100%	1st Mow	2nd Mow				
Date		4/13/2011	7/5/2011	7/6/2011	7/7/2011	7/8/2011			5/27/2010	8/1/2011	8/2/2011				
Clay	<.002 mm	0.30	0.1	0.1	0.2	0.9			0.10	2	0.6				
Silt	.002 - .05 mm	0.80	0.9	0.9	1.1	0.6			0.50	3.4	1.2				
Sand	.05 - 2.00 mm	98.80	98.7	98.5	98.5	97.4			99.40	93	97.5				
Gravel	>2.0 mm	0.10	0.3	0.5	0.2	1.1			0.00	1.6	0.7				
Organic Matter		0.41	0.87	0.75	0.99	0.78			0.21	2.27	0.99				
Sand Fractions															
Fine Gravel	2.0 mm	0.10	0.3	0.5	0.2	1.1			0.00	1.6	0.7				
Very Coarse Sand	1.0 mm	6.90	35.1	27	22.1	24.6			4.20	28.5	25.7				
Coarse Sand	.5 mm	30.80	53	57.9	60	59.6			28.00	46.7	57.4				
Medium Sand	.25 mm	44.00	10.1	12.8	15.1	12.2			46.60	15.7	13.4				
Fine Sand	.15 mm	14.20	0.4	0.7	1	0.8			16.00	1.6	0.8				
Very Fine Sand	.106 mm	2.40	0.1	0.1	0.2	0.1			3.90	0.3	0.1				
Very Fine Sand	.053 mm	0.50	0	0	0.1	0.1			0.70	0.2	0.1				
							Totals	%Totals						Totals	%Totals
Yards Applied/Removed		3.97	0.19	0.06	0.02	0.02	0.28		7.26	0.22	0.05	0.27			
Fine Gravel	2.0 mm	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00	1.44		
Very Coarse Sand	1.0 mm	0.27	0.07	0.02	0.00	0.00	0.09	32.58	0.30	0.06	0.01	0.08	28.01		
Coarse Sand	.5 mm	1.22	0.10	0.03	0.01	0.01	0.16	56.06	2.03	0.10	0.03	0.13	48.56		
Medium Sand	.25 mm	1.75	0.02	0.01	0.00	0.00	0.03	11.38	3.38	0.04	0.01	0.04	15.30		
Fine Sand	.15 mm	0.56	0.00	0.00	0.00	0.00	0.00	0.54	1.16	0.00	0.00	0.00	1.46		
Very Fine Sand	.106 mm	0.10	0.00	0.00	0.00	0.00	0.00	0.11	0.28	0.00	0.00	0.00	0.27		
Very Fine Sand	.053 mm	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.00	0.18		

Table 5.

Sample ID:		C.Stone	ECC	ECC	ECC	ECC			Os. HP	MCC	MCC				
Mix		100%	1st Mow	2nd Mow	3rd Mow	4th Mow			100%	1st Mow	2nd Mow				
Date		5/23/2010	7/6/2010	7/7/2010	7/8/2010	7/9/2010			5/27/2010	8/9/2010	8/9/2010				
Clay	<.002 mm	0.30	0.1	0.1	0.2	0			0.10	0.1	0.8				
Silt	.002 - .05 mm	0.40	0	0	0	0			0.50	0.6	0.1				
Sand	.05 - 2.00 mm	99.30	99.4	99.6	99.4	99.8			99.40	98.3	98.7				
Gravel	>2.0 mm	0.00	0.5	0.3	0.4	0.2			0.00	1	0.4				
Organic Matter		0.45	0.66	0.72	0.65	0.72			0.21	0.78	1.39				
Sand Fractions															
Fine Gravel	2.0 mm	0.00	0.5	0.3	0.4	0.2			0.00	1	0.4				
Very Coarse Sand	1.0 mm	6.00	41.8	29.9	24.4	27.3			4.20	34.9	22.3				
Coarse Sand	.5 mm	32.80	49.9	58.9	60.5	61.6			28.00	55.3	56.7				
Medium Sand	.25 mm	43.10	7.1	10.1	13.4	10.2			46.60	7.1	17.6				
Fine Sand	.15 mm	14.10	0.5	0.7	1	0.6			16.00	0.3	1.6				
Very Fine Sand	.106 mm	2.70	0.1	0	0.1	0.1			3.90	0.5	0.4				
Very Fine Sand	.053 mm	0.60	0	0	0	0			0.70	0.2	0.1				
							Totals	%Totals						Totals	%Totals
Yards Applied/Removed		3.97	0.12	0.05	0.03	0.03	0.23		7.26	0.09	0.05	0.14			
Fine Gravel	2.0 mm	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.80		
Very Coarse Sand	1.0 mm	0.24	0.05	0.01	0.01	0.01	0.08	34.84	0.30	0.03	0.01	0.04	30.64		
Coarse Sand	.5 mm	1.30	0.06	0.03	0.02	0.02	0.13	54.88	2.03	0.05	0.03	0.08	55.77		
Medium Sand	.25 mm	1.71	0.01	0.01	0.00	0.00	0.02	9.06	3.38	0.01	0.01	0.02	10.65		
Fine Sand	.15 mm	0.56	0.00	0.00	0.00	0.00	0.00	0.63	1.16	0.00	0.00	0.00	0.74		
Very Fine Sand	.106 mm	0.11	0.00	0.00	0.00	0.00	0.00	0.08	0.28	0.00	0.00	0.00	0.47		
Very Fine Sand	.053 mm	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.17		

Conclusions:

Surprisingly there was not a significant amount of sand being removed within the first four mowings following sand top-dressing. It was even more surprising that greater than 50% of the 1 mm (very coarse sand particles) were not removed within the first four mowings. There may be significant mower wear if top-dressing with a medium to coarse USGA sand, but these initial results indicate that the majority is being incorporated despite popular belief. If your root-zone consists of sand particles similar to these top-dressing sands, then I highly recommend keeping your top-dressing sand the same or coarser to avoid possibly creating a perched water table near the surface. It is still unknown whether or not there will be negative consequences for

top-dressing with a finer sand throughout the year and filling aeration holes with a coarser sand when aerating only.

This study will hopefully be continued utilizing varying cultural practices, top-dressing sands, varieties of turf, and possibly even more mowing collections and at the very least the last mowing prior to top-dressing will be collected.



The above pictures were taken from a USGA constructed green that experienced significant turf loss following a rain event. The top-dressing sand was significantly finer than the original root-zone despite meeting USGA guidelines. Unfortunately the root-zone utilized in the green was coarser than USGA guidelines causing the top-dressing sand to be incompatible. This will be a topic for another article.

Cooperative Effort With:

Many thanks to Greg Shaffer GCS at Elcona Country Club and Mike Edgerton GCS, Brian Hilfinger, and Andy O’Haver at Meadowbrook Country Club for their efforts in collecting and storing the sand. Thank you to the Brookside Consultants of Ohio for funding the laboratory testing and to the staff at Brookside Laboratories for their excellent service.