



### **How Effective is Your Sand Top-dressing Program (Part 3)?**

Based on the data collected over the last four years, golf course greens **can be effectively top-dressed** with very coarse (1 mm) or even coarse sand particles (0.5 mm) during regular top-dressing. Furthermore this process is greatly improved by the addition of approximately 0.35 - 0.5" of water/rain.

The same medium to coarse sand sources as previous years were utilized at both courses. Unfortunately the weather did not allow for the use of dried sand at ECC this year to further determine if a higher percentage of dried sand is removed than wet sand. Once again, rain events at MCC appear to have significantly reduced sand removal when mowing this year. Practices utilized following top-dressing are listed on Tables 3 and 4.

As before sand based greens would ideally be top-dressed with the same sand utilized for construction (as long as it is desirable). Utilizing a 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? Also, top-dressing with a finer material than 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 top-dressing sand. A physical analysis of the root-zone sand may be needed in order to determine if a desirable root-zone is being formed. 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 placing on clean surface or container and stored 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/](http://www.usga.org/course_care/articles/construction/greens/Quality-Control-Sampling-of-Sand-and-Rootzone-Mixture-Stockpiles/))

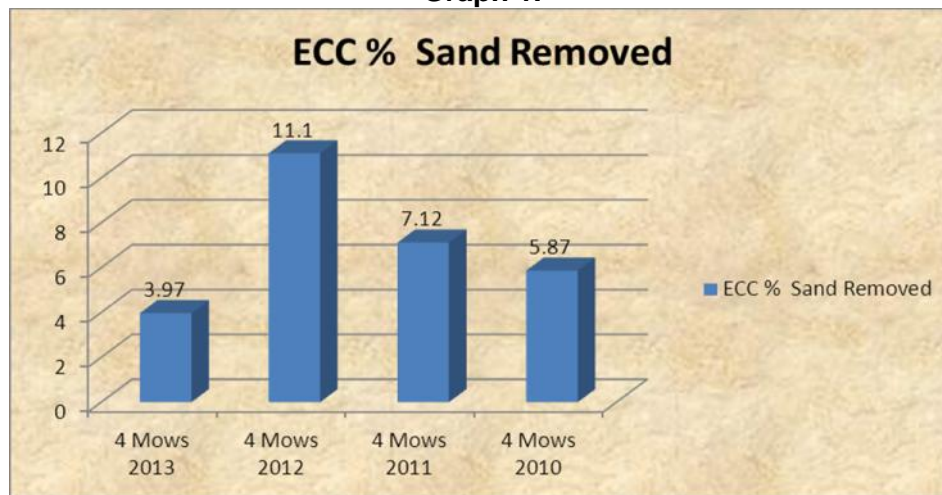
- Sample was submitted to Brookside Laboratories, Inc (USGA/A2LA Accredited) for testing

**Results:**

**Sand Quantity Measurements:** Two different top-dressing sands and golf courses have been 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 1 and 2 as Country Stone and Osburn HP.

Surprisingly, the data collected in 2012 from ECC indicates that a higher percentage of sand is removed (Graph 1.) if utilizing dried sand even with a slightly higher height of cut (.12 vs .115). The average amount of wet sand removed from ECC is roughly 5.6% after four mowings, but this increased to 11% last year when utilizing dry sand.

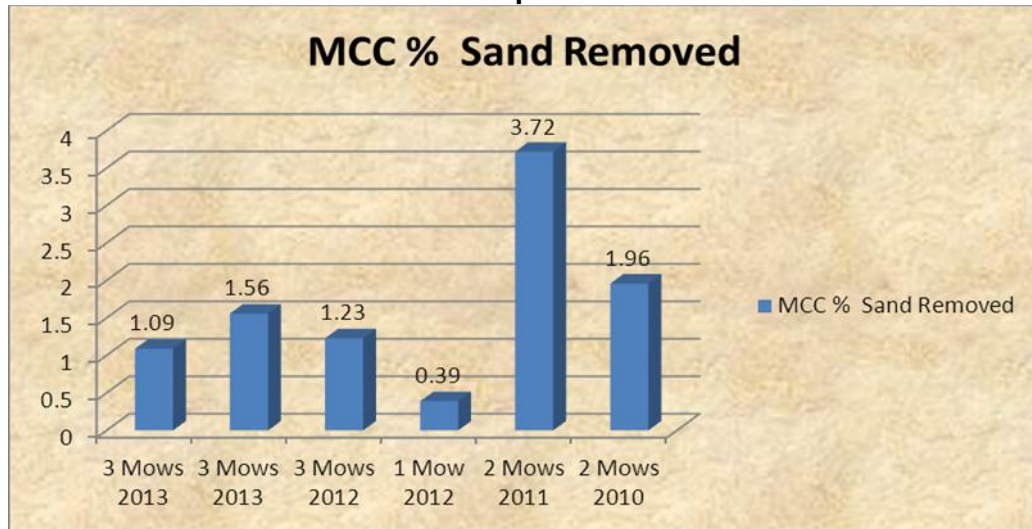
**Graph 1.**



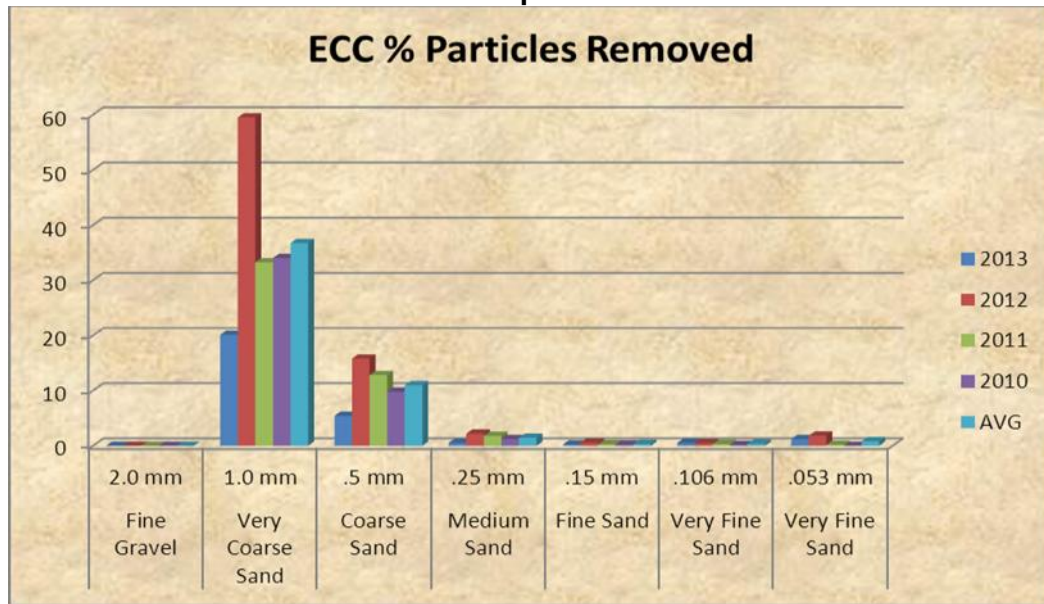
Roughly 0.5" of rain was received during the two sand collections at MCC this year. The collection showing 1.09% removal was verti-cut after top-dressed as compared to the 1.56% not being verti-cut. The first set of data (3 mows) collected in 2012 from MCC indicates that 0.5" of rain after top-dressing and skipping a day of mowing significantly reduced the amount of sand removed during the first mowing (as expected). The second set of data (1 mow) from MCC in 2012 also indicates that rolling for two days without mowing after top-dressing and raising mowing height from .12 to .13 significantly reduced the amount of sand removed during the first mowing as compared to the four year averages (Graph 7).

The total amount of sand removed from MCC is significantly less than ECC partially due to the reduced collections, but the varied cultural practices and rain appear to significantly impact the amount being collected even when compared to previous years (Graph 2.).

Graph 2.

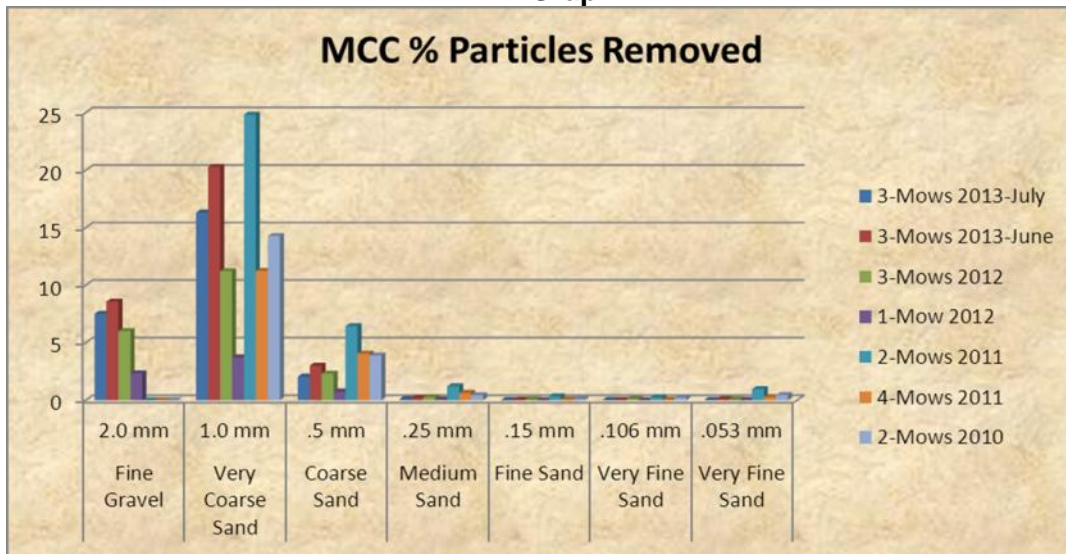


Graph 3.

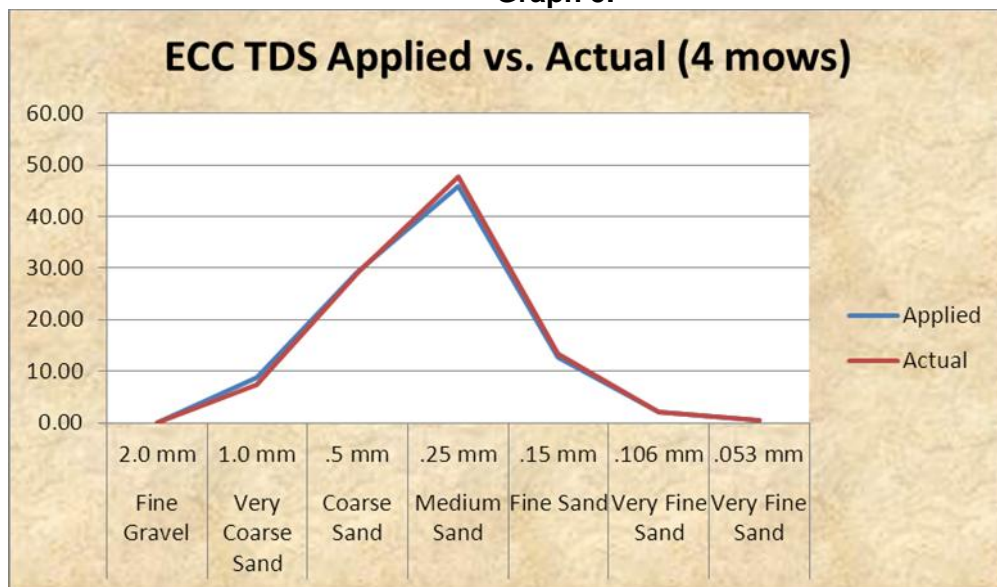


Graphs 3 and 4 continue to indicate that at least 65% of the very coarse particles and at least 85% of the coarse particles applied are not removed after three to four mowings. When using dry sand at ECC in 2012, there was a significant increase in the percentage of Very Coarse Sand (1mm) removed, but the current and previous years of data indicated that more than 60% was not removed. Fortunately these top-dressing sands contained no more than 7.7% Very Coarse Sand, and this is not a significant amount of the sand actually being applied.

Graph 4.



Graph 5.

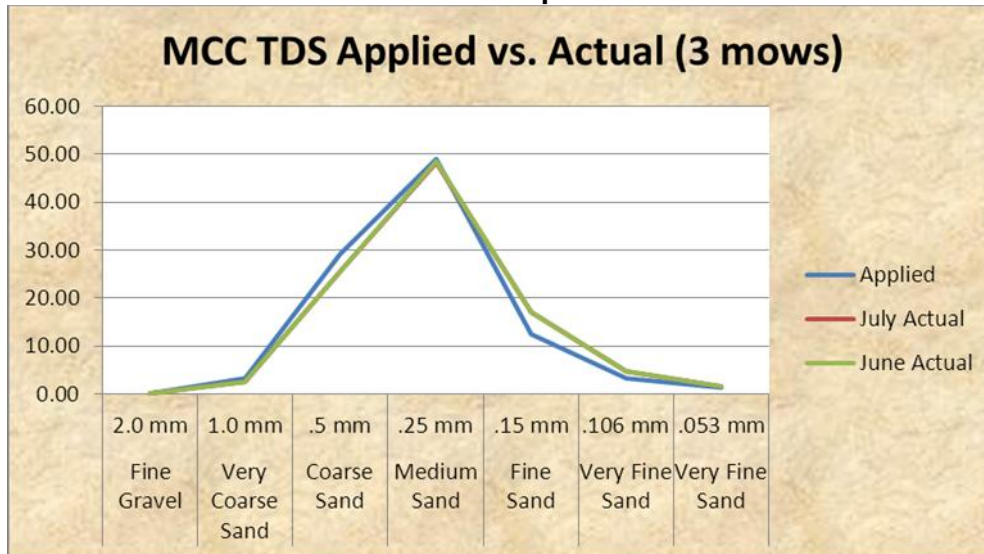


Graph 5. demonstrates what the difference between the applied top-dressing sand and the calculated actual that was not removed. The differences are much less significant than last year when dried sand was utilized. The actual percentages are listed below.

Table 1.

Sand Fractions		C.Stone	Calculated
Fine Gravel	2.0 mm	0.00	0.00
Very Coarse Sand	1.0 mm	8.80	7.35
Coarse Sand	.5 mm	29.30	29.02
Medium Sand	.25 mm	45.80	47.75
Fine Sand	.15 mm	12.80	13.39
Very Fine Sand	.106 mm	2.00	2.09
Very Fine Sand	.053 mm	0.40	0.41

Graph 6.

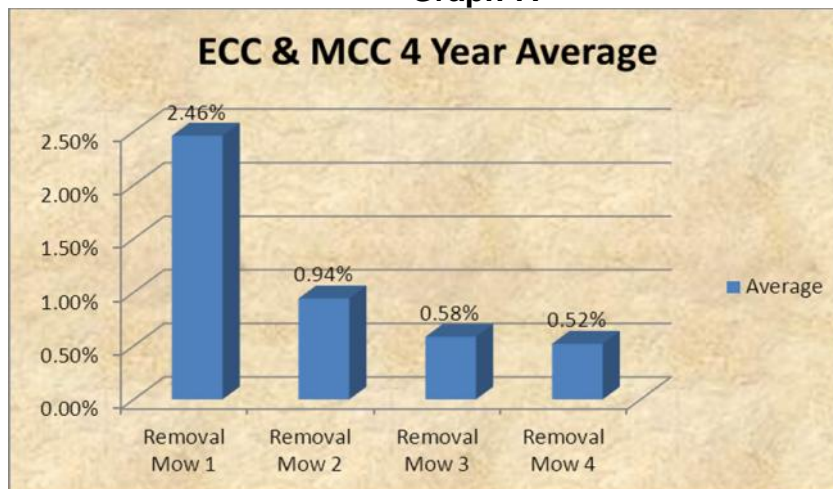


Graph 6. demonstrates what the difference between the applied top-dressing sand and the calculated actual that was not removed at MCC during the 3 mow collections. Due to the minimal removal, these sands are nearly identical which is consistent with the data from 2012. The actual percentages for 2013 are listed below.

Table 2.

Sand Fractions		Osburn	July Actual	June Actual
Fine Gravel	2.0 mm	0.10	0.10	0.09
Very Coarse Sand	1.0 mm	3.40	2.57	2.45
Coarse Sand	.5 mm	29.20	25.59	25.44
Medium Sand	.25 mm	49.00	48.30	48.46
Fine Sand	.15 mm	12.60	17.07	17.14
Very Fine Sand	.106 mm	3.20	4.73	4.75
Very Fine Sand	.053 mm	1.40	1.65	1.65

Graph 7.



Graph 7 shows the four year average for the total amount of top-dressing sand removed each mowing. As expected the first mowing removes the largest amount while there is little difference between mowings three and four.

**Table 3. (ECC Course Information)**

Golf Course	Elcona CC-2013	Elcona CC-2012	Elcona CC-2011	Elcona CC-2010
mowing height	0.12	0.12	0.115	0.115
sand source	Country Stone	Country Stone (Dried)	Country Stone	Country Stone
total yards applied	3.75	1.53	4.0	4.0
square footage of greens	95741	95741	95741	95741
mower	Toro 1000	Toro 1000	Toro 1000	Toro 1000
top-dresser	Dakota 410	Lesco Rotary wide open	Dakota 410	Dakota 410
turf type	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass
mowing 1 (gallons)	18.330	17.400	37.700	24.000
yards <sup>3</sup>	0.091	0.086	0.187	0.119
mowing 2 (gallons)	5.400	8.220	12.160	10.160
yards <sup>3</sup>	0.027	0.041	0.060	0.050
mowing 3 (gallons)	3.600	5.000	4.150	6.900
yards <sup>3</sup>	0.018	0.025	0.021	0.034
mowing 4 (gallons)	2.720	3.220	3.090	6.150
yards <sup>3</sup>	0.013	0.016	0.015	0.030
mowing 5 (gallons)				
yards <sup>3</sup>				
Total Gallons	30.050	33.840	57.100	47.210
Total Yards	0.149	0.168	0.283	0.234
% removed	3.97%	10.95%	7.07%	5.84%
Cultural practices before	mow	mow	mow	mow
Cultural practices after	drag w/ coco mat water 10 min mow daily roll 5 days / week	drag w/ coco mat water 10 min mow daily roll 5 days / week	drag w/ coco mat water 10 min mow daily roll 5 days / week	drag w/ coco mat water 10 min mow daily roll 5 days / week
	not rolled until two days after TD	not rolled until two days after TD	not rolled until two days after TD	not rolled until two days after TD
Thanks to	Greg Shaffer	Greg Shaffer, Rick	Greg Shaffer, Cody	Greg Shaffer, Wade

**Table 4. (MCC Course Information)**

MCC - 2013 July	MCC - 2013 June	MCC - 2012 October	MCC - 2012	MCC - 2011	MCC - 2010
0.12	0.12	0.13	0.12	0.12	0.12
Osburn, HP	Osburn, HP	Osburn, HP	Osburn, HP	Osburn, HP	Osburn, HP
8.9	7.8	9.3	7.5	7.3	7.3
110000	110000	110000	110000	110000	110000
Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)	Jacobsen Triplex (solid roller)
Turfco sp1530	Turfco sp1530	Turfco sp1530	Turfco sp1530	Turfco sp1530	Turfco sp1530
Annual Bluegrass	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass	Annual Bluegrass
13.6	13	7.33	8.23	45	19
0.067	0.064	0.036	0.041	0.223	0.094
4.03	7.6		5	9.56	9.6
0.020	0.038	0.000	0.025	0.047	0.048
1.980	2.680		5.000		
0.010	0.013	0.000	0.025		
	1.26				
0.000	0.006				
= second mow after .35" rain	= first mow after .5" rain				
19.610	24.540	7.330	18.230	54.560	28.600
0.097	0.121	0.036	0.090	0.270	0.142
1.09%	1.56%	0.39%	1.20%	3.70%	1.94%
	single verti-cut	single verti-cut	single verti-cut	single verti-cut 1/16"	single verti-cut
V-Cut after setting 0	sprayed Wetting Agent	rolled (speed roller) 2 days	brushed	brushed	brushed
Broom	10 min water	no mow for 2 days	rosebud in	backpack blow	rosebud in
Roll	.5" rain middle of first mow		backpack blow	rosebud in	backpack blow
10 min water	rolled after 1st mow		rolled (speed roller)	rolled (speed roller)	rolled (speed roller)
Sprayed	walk mowed .120 toro 1000				
.185" rain 3-5 pm	2nd and 3rd mow		Rained 0.47" before first mow	first mowing was next day	*both mowings same day TD
rolled after each mow					
Mike Edgerton, Rick Spino	Mike Edgerton, Rick Spino	Mike Edgerton, Rick Spino	Mike Edgerton	Mike Edgerton, Andy O'Haver	Mike Edgerton, Brian Hilfinger

**Conclusions:**

In addition to increased mowing heights, waiting 1-2 days before mowing, and rolling, top-dressing sand incorporation appears to be significantly increased following 0.35-0.5" of rain/ irrigation water. Initial data suggests that verti-cutting following top-dressing will also help to reduce the amount of sand being removed when mowing, and this will hopefully be determined in the near future.

As before, the data indicates that a **medium to coarse USGA sand can be effectively utilized** for sand top-dressing Poa/Bent greens.

Once again, this study will hopefully be continued utilizing varying cultural practices, top-dressing sands, varieties of turf, and possibly even more mowing collections. The plan is also to collect the last mowing prior to top-dressing and determine how much if any sand is present.

**Cooperative Effort With:**

Many thanks to Greg Shaffer GCS at Elcona Country Club and Mike Edgerton GCS at Meadowbrook Country Club and their staff 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.