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Golf Course Putting Green Organic Matter Recycling Study

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Introduction

Putting greens on golf courses are the highest maintenance turfgrass that exists. Creeping bentgrass (*Agrostis stolonifera* L.) often is used for cool-season putting greens due to the ability of the turfgrass to tolerate a low mowing height and provide a high density turf. Managing organic matter is necessary to maintain a high quality turfgrass at 0.125 in. height of cut that will drain quickly after a rain to resume play.

Traditionally, organic matter has been managed by a three-step process: hollow tine aerification, removal of the cores from the surface, and applications of new sand to the putting green. However, many superintendents cannot afford to buy new sand every year.

Wiedenmann Turf Equipment Company offers a machine that will remove much of the organic matter from aerification cores by spinning them over screens and allowing the sand particles to fall back to the putting green surface, while collecting the organic matter in a basket for removal.

The objective of this project is to compare if putting green surfaces subjected to core recycling perform as well as traditional organic matter removal practices. This is the first of a two-year study.

Materials and Methods

Research was conducted at the Iowa State University Horticulture Research Station on a USGA sand-based creeping bentgrass putting green.

The experimental design was a randomized strip plot design. Whole plot treatments were either 1) traditional hollow tine aerification, core removal, and new sand applications, or 2) hollow tine aerification, recycling of cores, and additional new sand added to fill in aerification holes. Strip plot treatments were sand topdressing timing with either a) sand topdressed before hollow tine aerification or b) sand topdressed after hollow tine aerification. Four replications of every treatment were included and the study will be repeated over two years.

Treatments were applied September 19, 2016, with a 0.625 in. hollow tine aerification tine on 2 in. by 2 in. spacing with a Toro ProCore 648 aerifier.

Three random locations on every plot were selected where digital images would be captured, and Digital Image Analysis (DIA) was performed to track recovery of green tissue. These pictures were collected weekly and the data will be used to track weeks until 100 percent green cover.

Additional data collected included surface hardness with a TruFirm device, green speed, water infiltration, clippings to determine if more sand was removed, and soil organic samples.

Results and Discussion

A significant date-by-treatment interaction was determined between DIA $P > 0.001$

(Table 1), soil organic matter (P > 0.0001), and percent sand in clippings (P > 0.001). As expected, treatments increased in percent green cover with time, and differences between treatments existed on only one date. Orthogonal contrast statements determined a significantly higher organic matter (P > 0.02) level in core recycling treatments than the traditional aerification treatments. These results indicate the screens on the machine remove a large portion of organic matter while returning the sand portion as compared with a total core removal.

Also, soil organic matter after treatments healed were one percent higher in the core recycled treatments compared with the traditional aerification methods. This could be because some organic matter returns to the surface with the recycling treatment, while the traditional treatment removes all the old cores. A greater amount of sand was collected in the mower buckets from treatments that were topdressed first, then subjected to aerification, than those that were aerified and then topdressed regardless of core recycling treatments. This indicates more sand was left on the surface from topdressing before aerification than only topdressing after aerification. No significant differences were detected in clippings collected, water infiltration rates, or green speed between treatments.

Early results indicate putting greens subjected to a core recycling program will not see noticeable differences in performance, compared with those that are aerified and the cores removed with additions of fresh sand. Also, one-year results indicate sand topdressing before aerification will result in more sand being picked up by the mower in the first few mowings after aerification.

Acknowledgements

Appreciation is extended to Wiedenmann North America LLC and Will Wolverton for donating a core recycler for this study.

Table 1. Digital Image Analysis for date-by-treatment of percent green turfgrass cover for various putting green organic matter management treatments.

	Percent green turfgrass cover			
Treatment description	**0 DAT**	**7 DAT**	**14 DAT**	**21 DAT[e]**
Traditional (T)[a] + topdress post aerification (TPA)[b]	26.9	76.7	82.8	81.7
T + topdresss before aerification(TBA)[c]	25.9	71.2	78.0	74.2
Core recycling (CR)[d] + TBA	27.0	73.6	82.1	79.0
CR + TPA	25.8	75.8	82.1	79.6
LSD (P = 0.05)	4.6	5.2	6.1	7.2

[a]Traditional aerification consisted of hollow tine aerification and core removal (T).
[b]Topdress post aerification consisted of adding new sand after aerification (TPA).
[c]Topdress before aerification consisted of adding new sand before aerification and additional sand as needed to fill aerification holes after aerification (TBA).
[d]Core recycling consisted of hollow tine aerification and having cores subjected to the Wiedenmann Core Recycler to return sand from the cores back to the plots (CR).
[e]DAT = Days after treatment.