Evaluation of Hollow Tine Core Aerification Recycling on Sand-Based Putting Greens

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Introduction

Golf course superintendents struggle to find affordable topdressing sand for putting greens that offers characteristics to benefit the rootzone after hollow tine aerification. This is especially problematic in areas where the cost of trucking is greater than the sand.

Aerification is a critically important practice for golf course superintendents to maintain healthy putting greens and limit organic matter increases in sand-based rootzones. Topdressing with all new sand after aerification can be costly and often budgets restrict how much sand topdressing can be done. As a result, many lower budget golf courses will skip a time period between hollow tine aerification and topdressing, or the superintendent will drag back in the cores to try to reduce the amount of sand needed for topdressing. Skipping aerification and topdressing has created layering problems in putting greens from a buildup of organic matter.

The objectives of the project are to compare the performance and playability of sand-based putting green plots that are either:

1. subjected to hollow tine aerification, all of the cores are removed, and topdressing is applied;
2. subjected to hollow tine aerification, the cores are verticut, chopped cores are dragged back in, excess organic matter is removed, and additional topdressing is added as needed, or;
3. subjected to hollow tine aerification, cores are processed through the Core Recycler, and additional topdressing sand is added as needed.

Also, at the end of the study, an economical comparison will be conducted for each of the three treatments listed in objective 1, and the amount of sand saved by recycling cores determined.

Materials and Methods

This research project is being conducted at the Iowa State University Horticulture Research Station, Ames, Iowa, on a Penncross creeping bentgrass (*Agrostis stolonifera* L.) putting green established over a rootzone that was constructed to meet USGA putting green specifications. The plots were maintained to optimize turfgrass health with proper fertilization and minimize turfgrass disease, weed, and insect pressure. The creeping bentgrass was mowed six times/week at 0.125 in.-height of cut with a reel mower to simulate a golf course putting green. Additional water is applied through irrigation to minimize turfgrass stress. The study was conducted in a randomized complete block design with three replications.

Before aerification, each plot was evaluated for organic matter in the rootzone, water infiltration, total soil pore space, percent turfgrass cover, green speed, and surface hardness with the TruFirm. Hollow tine aerification was applied on a 2 in. x 2 in. spacing with ¾ in. tines August 30, 2018. Plots then were subjected to one of the three treatments explained in the objectives. Additional topdressing sand conforming to

USGA putting green specifications was added to the plots to ensure the aerification holes were filled. After treatments were applied, plots were tracked weekly for recovery (percent green cover with digital image analysis), green speed, volumetric soil moisture, and surface hardness. After turfgrass recovery, plots were tested for soil organic matter, water infiltration, and total porosity.

Results and Discussion

Data were analyzed in Proc Mixed in SAS. Means were separated at the 0.05 level of significance with Fisher's LSD. Soil organic matter levels did not differ between treatments after any rating date in 2018. Soil organic matter was 5 percent before treatments were applied and the levels were reduced on every plot after aeration and core treatments were applied: 4.3 percent for the core recycler and traditional treatments and 4.05 percent for the verticutting and dragging of the cores treatment. Creeping bentgrass cover increased over time after aerification, as expected, and all treatments were fully recovered from aeration by week two (Figure 1). Percent green cover only differed between treatments on the first week after aeration when the traditional aeration methods had a higher percent green cover (88%) than the core recycler treatments (79%), but not the verticutting of the cores method (82%).

No differences were found between treatments for soil moisture, green speed, green hardness, or water infiltration during year one. Higher levels of sand were found in the clippings from the core recycler treatments and the verticutting of the core treatments as compared with the traditional removal and topdressing method on three of four rating dates (Table 1).

Treatments will be repeated over two years. Additionally, an economic figure will be calculated for the savings in sand and cost between treatments for 2018.

Acknowledgements

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Table 1. Percent sand in total clipping weight captured after aeration and hollow tine core treatments with topdressing, 2018.

Treatment	7 DAT[1]	14 DAT	21 DAT	28 DAT
Core Recycler[2]	94	94	35	35
Traditional[3]	93	93	35	31
Verticutting[4]	95	95	35	33
LSD (0.05)[5]	1	0.5	1	0.5

[1]Hollow tine aeration was performed August 30, 2018 with ratings every 7 days after aeration.
[2]Hollow tine aeration cores were processed with the Wiedenmann Core Recycler returning low organic matter sand, and additional topdressing sand added as needed.
[3]Traditional treatments consisted of hollow tine aeration core removal and addition of new topdressing sand.
[4]Verticutting treatments consisted of hollow tine aeration, then verticutting of the cores, dragging back in and additional topdressing sand as needed.
[5]Means were separated at the 0.05 level of probability.

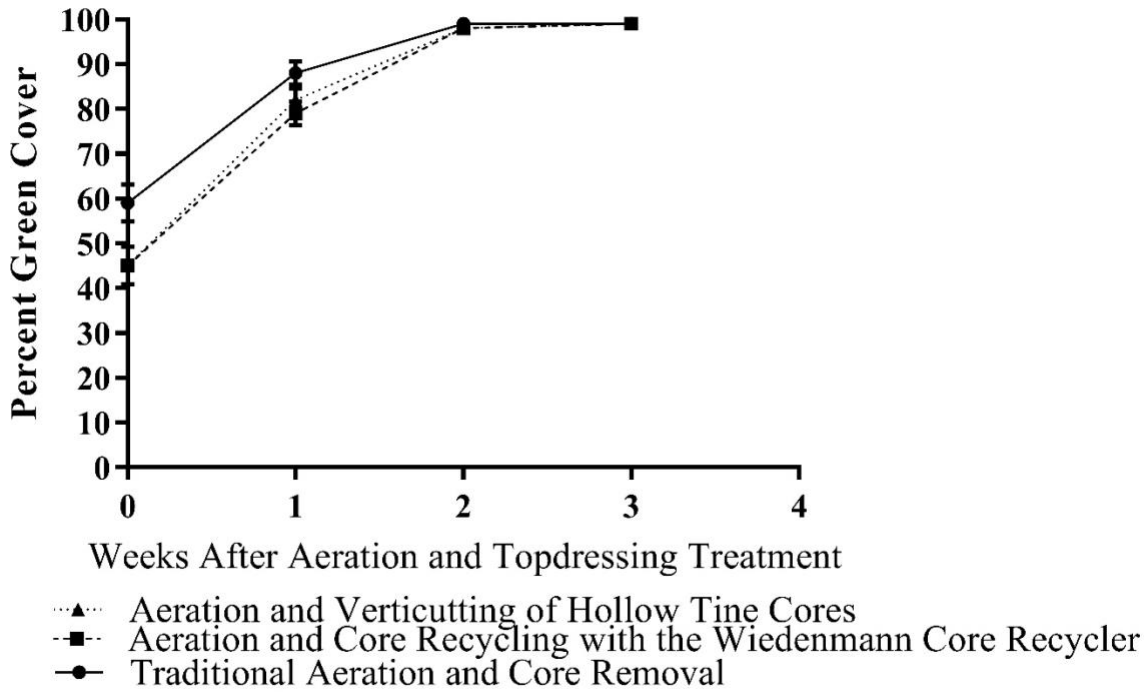

Figure 1. Percent green cover of a creeping bentgrass putting green as determined with digital image analysis four weeks after aeration and hollow tine core treatment, 2018.