Proprietary Nutrient Program for Aerification Recovery

RFR-A1817

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Introduction

Core aerification is an effective cultivation activity employed by golf courses, athletic fields, and lawn care companies to manage thatch amounts in turfgrass and to alleviate soil compaction due to traffic in turfgrass systems. In the case of golf course putting greens, tees, and fairways, quick recovery of aerification holes is preferred because slow recovery reduces turf quality and golfer satisfaction. Course owners and private club greens committees often are against the practice of aerification due to potential loss of revenue. Yet because of the many agronomic benefits of aerification, turf managers perform this task multiple times annually. Therefore, nutrient programs to improve recovery timeframe need to be investigated.

The objective of this trial was to evaluate the effects of different rates of a proprietary nutrient program applied as a liquid foliar spray on the recovery timeframe of core aerification holes on a creeping bentgrass (*Agrostis stolonifera* L.) golf green. A secondary objective was to evaluate turfgrass color and turfgrass injury (chlorosis) as the trial progressed.

Materials and Methods

This trial was conducted at the Iowa State University Horticulture Research Station, Ames, Iowa, on a native soil creeping bentgrass (*Agrostis stolonifera*) putting green. Turf was cut five days/week at 0.140 in. using a riding reel mower. Irrigation was applied as necessary to facilitate optimal growing conditions. Fertility rate was 0.5 lb N/1,000 ft^2 per month using a combination of foliar urea applications and granular slow release fertilizers. Aerification was not performed in the trial area in 2018, but light verticutting and topdressing occurred monthly. Treatments, rates, and timings for this trial are presented in Table 1. Three iterations of this trial were performed fall 2018. Reasoning for three trials is detailed in the Results and Discussion section. Experimental units were 5 ft x 10 ft. Hollow tine core cultivation was performed using a Toro ProCore 648 on 2 in. x 2 in. spacing at 3 in. depth with 0.5 in. diameter tines. Treatments were applied using a CO_2-pressurized backpack sprayer with TeeJet 8004XR nozzles calibrated to apply two gallons water carrier per 1,000 ft^2. Treatment application was seven days prior to aerification, at aerification, and seven days post aerification. Treatments were arranged as a randomized complete block design with four replications. Visual and digital recovery ratings were taken weekly for four weeks after aerification. Visual turfgrass quality and chlorosis were rated on the same timeframe.

Results and Discussion

Iteration 1. Treatments were applied at rates and dates noted in Table 1. Minor bentgrass chlorosis was observed after the first application and considerable bentgrass chlorosis was observed shortly after the second application. Communication was initiated with the representative for Harrell's and discussion lead to lesser rates for Iteration 2. Data collection for Iteration 1 was abandoned as the chlorosis levels were above acceptable levels.

Iteration 2. Treatments were applied at rates and dates noted in Table 1. From discussion, it was decided to make the new "high rate" half

of the old "low rate." Minor bentgrass chlorosis was observed after the first application and was slightly increased by the second application. Chlorosis, as measured by visual and digital color (Figure 1), still was above acceptable levels for both new/reduced rates. Both product rates significantly improved visual percent recovery compared with the untreated control (Figure 2). Although the product increased vertical and horizontal bentgrass growth/recovery, the chlorosis effect made the treatments unacceptable to any golf turf manager.

Iteration 3. Treatments were applied at rates and dates noted in Table 1. From discussion during Iteration 2, it was decided to again reduce the application rates by the same factor of dilution from Iteration 1 to Iteration 2. Unfortunately, due to the late start of Iteration 3 and unseasonably cold weather, regrowth of bentgrass aeration holes was minimal. Low temperatures and snow cover caused the bentgrass plants to enter dormancy weeks before normal. Temperatures were consistently 15-30°F lower than historical averages.

Overall, this proprietary nutrient application has potential to decrease aeration hole recovery time for creeping bentgrass greens. Horizontal and especially vertical bentgrass growth increased. The beginning rates of 4 and 8 oz/1,000 ft^2 were too high, and less chlorosis was observed as the rates were reduced to 1 oz/1,000 ft^2 or lower. At this point, it is unclear if lower rates of 0.25 and 0.5 oz/1,000 ft^2 would be effective at enhancing recovery because these were applied during cold temperatures. Repeating this rate reduction in spring 2019 will be necessary. Future trials could involve the frequency and number of applications to reduce chlorosis. The addition of iron to the product also could possibly mask some of the chlorotic effects.

Acknowledgements

The authors would like to thank Harrell's for donation of test products and for financial funding for this project.

Table 1. Treatment descriptions and timings for Proprietary Nutrient Program for Aerification Recovery Trial, 2018.

Iteration	Treatment number	Treatment rate[1]	Application dates	Aeration date
1	1	0	September 27, October 4	---
1	2	4	September 27, October 4	---
1	3	8	September 27, October 4	---
2	1	0	October 5, 11, and 18	October 11
2	2	1	October 5, 11, and 18	October 11
2	3	2	October 5, 11, and 18	October 11
3	1	0	October 27, November 2 and 12	November 2
3	2	0.25	October 27, November 2 and 12	November 2
3	3	0.5	October 27, November 2 and 12	November 2

[1]Rates are in fluid oz/1,000 ft^2.

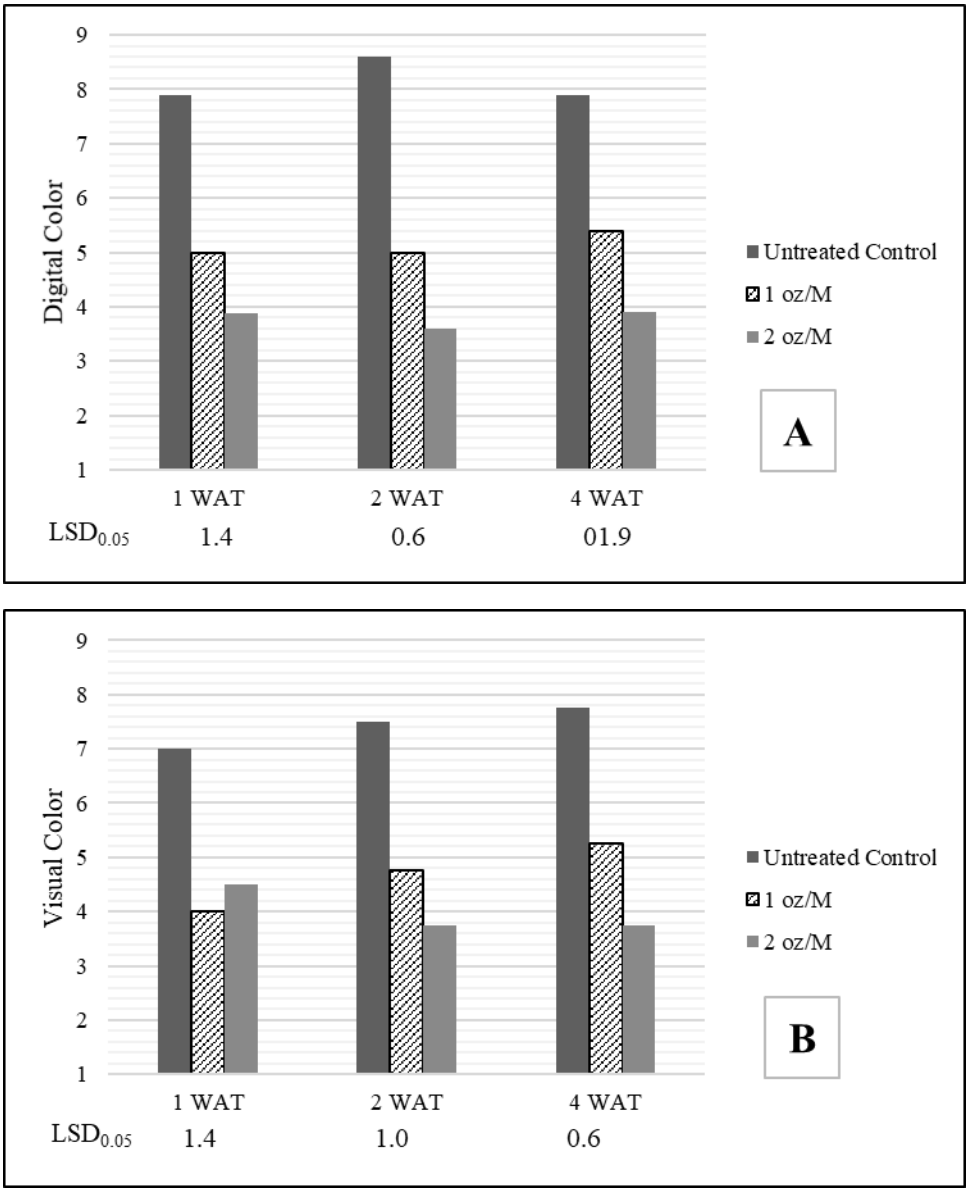

Figure 1. Turfgrass color ratings for Iteration 2 of Proprietary Nutrient Program for Aerification Recovery Trial by treatment and weeks after aeration treatment, as measured by digital color analysis (A) and visual color analysis (B), 2018. Color ratings are on a 1-9 scale, 9 = optimal color, 1 = dead/dormant, and 6 = the lowest acceptable rating.

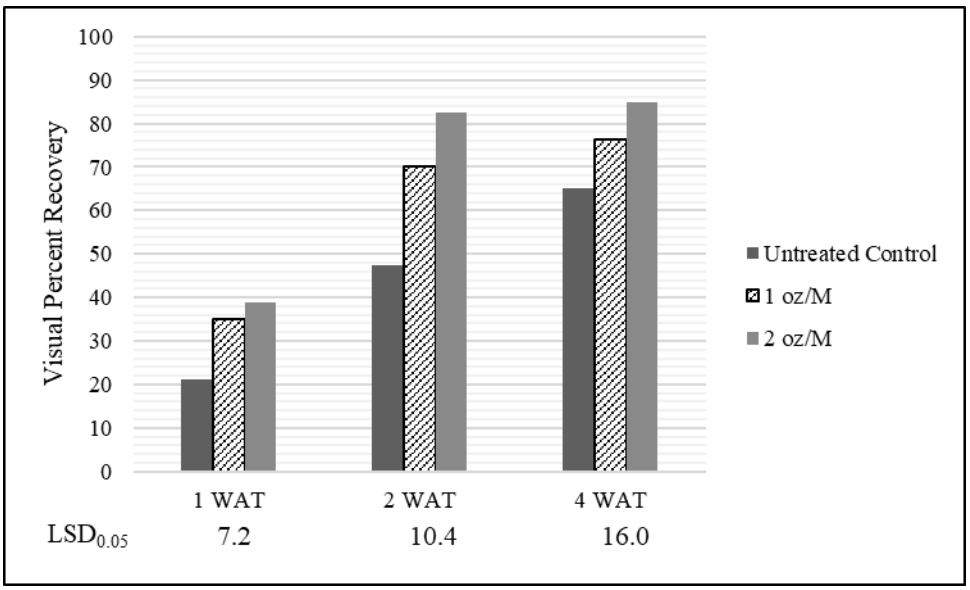

Figure 2. Visual percent aeration hole recovery for Iteration 2 of Proprietary Nutrient Program for Aerification Recovery Trial for treatment and weeks after aeration treatment, 2018.