

# Harrell's Spring Aeration Recovery Trial

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### Introduction

The objective of this trial was to evaluate the effects of different rates of Harrell's TO Booster, with and without urea, applied as a liquid foliar spray, on the recovery timeframe of core aeration holes on a creeping bentgrass (*Agrostis stolonifera* L.) golf course putting green. A secondary objective was to evaluate turfgrass quality and turfgrass injury (chlorosis) as the trial progressed.

### Materials and Methods

The trial was conducted at the Iowa State University Horticulture Research Station, Ames, Iowa, on a sand-based creeping bentgrass putting green. Turf was cut five days/week at 0.125 in. using a riding reel mower. Irrigation was applied as necessary to facilitate optimal growing conditions. Treatments, rates, and timings for this trial are presented in Table 1. Experimental units were 4 ft by 8 ft. Hollow tine core cultivation was performed using a Toro ProCore 648 on 2 in. by 2 in. spacing at 3 in. depth with 0.5 in. diameter tines to the entire experimental area. No aeration was performed to the putting green prior to the experiment in 2020.

Treatments were applied using a CO<sub>2</sub>-pressurized backpack sprayer with TeeJet 8004XR nozzles calibrated to apply two gallons water carrier/1,000 ft<sup>2</sup>. Treatment application was seven days prior to aeration (April 28), immediately following aeration/topdressing (May 4), and seven days post aeration (May 11). Treatments were arranged as a randomized complete block design with four replications. Recovery,

quality, and percent turf cover ratings were taken weekly for four weeks after aeration (WAA). Recovery was visually rated on a 1-9 scale, 1 = no recovery and 9 = full recovery. Visual quality also was rated on a 1-9 scale, 1 = brown turf, 6 = the lowest acceptable rating, and 9 = dark green, dense turf cover. Percent turf cover was assessed electronically with a light box using digital image analysis.

### Results and Discussion

Visual recovery (Table 3) differences were present at 1, 2, and 3 WAA. The urea + high rate of TO Booster treatment had better recovery than the aerified control treatment at 1 WAA. At 2 WAA, all treatments had better recovery than the aerified control while at 3 WAA, both urea + TO Booster treatments had better recovery than the aerified control and the TO Booster-only treatments. Overall, the urea + TO Booster treatments had the highest recovery ratings at each significant date (Table 2).

Digital percent cover rating (Table 4) differences were present at 1 and 2 WAA. At 1 WAA, urea alone had greater percent cover than the aerified control. At 2 WAA, all treatments that included urea had greater percent cover than the aerified control. As shown by no differences at 0 WAA (pictures taken directly after aeration and topdressing), our aeration and topdressing application was uniform. In addition, the turfgrass started at 100 percent uniformity across all treatments (1 WBA). Although digital image analysis is reliable for determining percent green cover (dense turf versus sand/void), it does not take into account other turf quality factors that can be gleaned from visual ratings, as evidenced by higher incidence of significant results in the visual quality ratings below. This is generally accepted by the turfgrass research

community, as turfgrass quality has never been accepted to be rated digitally.

No chlorosis was observed with any treatments.

Visual quality data (Table 5) differences were present at all rating dates except one week before aeration (WBA). On each rating date, the urea + high rate of TO Booster treatment had higher visual quality than the aerified control. This resulted from a darker green turf color, likely due to the high rate of TO Booster combined with urea.

### Acknowledgements

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**Table 1. Treatment descriptions and timings for Harrell's Spring Aerification Recovery Trial, Ames, Iowa.**

Treatment number	Treatment product(s)	Treatment rate <sup>a</sup>	Application dates
1	Urea	0.15 lb N/M	April 24, May 4, May 11
2	Urea + TO Booster	0.15 lb N/M + 0.275 oz/M	April 24, May 4, May 11
3	Urea + TO Booster	0.15 lb N/M + 0.550 oz/M	April 24, May 4, May 11
4	TO Booster low	0.275 oz/M	April 24, May 4, May 11
5	TO Booster high	0.550 oz/M	April 24, May 4, May 11
6	Aerify/Topdress only	---	May 4

<sup>a</sup> M = 1,000 ft<sup>2</sup>.

**Table 2. P-values for data parameters, Harrell's Spring Aerification Recovery Trial, Ames, Iowa.**

WAA <sup>a</sup>	Visual recovery		Visual quality		Digital percent cover	
	Rep	Treatment	Rep	Treatment	Rep	Treatment
-1	na	na	ns	ns	0.31	0.264
0	na	na	0.16	0.146	0.48	0.928
1	0.24	0.006	0.01	< 0.0001	0.01	0.012
2	0.16	0.005	0.02	< 0.0001	0.39	0.123
3	0.38	< 0.0001	0.03	0.0001	0.94	0.601
4	na	na	0.12	< 0.0001	na	na

<sup>a</sup>WAA = weeks after aeration.

na = not applicable.

ns = not significant.

**Table 3. Summary of visual recovery data, Harrell's Spring Aerification Recovery Trial, Ames, Iowa.<sup>a</sup>**

Treatment	1 WAA <sup>b</sup>	2 WAA	3 WAA	4 WAA
Urea	4.125	7.375	8.250	9.0
Urea + TO Booster low	4.375	7.750	8.750	9.0
Urea + TO Booster high	5.125	7.750	9.000	9.0
TO Booster low	4.375	6.875	7.625	9.0
TO Booster high	4.375	7.250	8.000	9.0
Aerified Control	3.000	5.875	7.875	9.0
<b>LSD at P ≤ 0.05</b>	0.925	0.922	0.413	ns

<sup>a</sup>1-9 scale; 6 = acceptable, 9 = dark dense green turf.

<sup>b</sup>WAA = weeks after aeration.

ns = not significant.

**Table 4. Summary of digital percent cover (1-100 scale), Harrell's Spring Aeration Recovery Trial, Ames, Iowa.**

Treatment	1 WBA <sup>a</sup>	0 WAA <sup>b</sup>	1 WAA	2 WAA	3 WAA
Urea	100	78.6	96.3	100	100
Urea + TO Booster low	100	77.8	95.3	100	100
Urea + TO Booster high	100	79.2	94.4	100	100
TO Booster low	100	81.1	90.8	99.5	100
TO Booster high	100	81.5	92.2	99.6	100
Aerified Control	100	76.6	89.4	99.0	100
<b>LSD at P ≤ 0.05</b>	ns	ns	3.9	0.8	ns

<sup>a</sup>WBA = weeks before aeration.<sup>b</sup>WAA = weeks after aeration.

ns = not significant.

**Table 5. Summary of visual quality data, Harrell's Spring Aeration Recovery Trial, Ames, Iowa.<sup>a</sup>**

Treatment	1 WBA <sup>b</sup>	0 WAA <sup>c</sup>	1 WAA	2 WAA	3 WAA
Urea	7.0	6.125	6.750	6.875	7.375
Urea + TO Booster low	7.0	6.000	7.000	6.875	7.500
Urea + TO Booster high	7.0	6.625	7.250	7.375	7.875
TO Booster low	7.0	6.375	6.625	6.375	7.000
TO Booster high	7.0	6.500	6.750	6.375	7.125
Aerified Control	7.0	6.000	5.875	6.000	6.625
<b>LSD at P ≤ 0.05</b>	ns	0.577	0.373	0.272	0.389

<sup>a</sup>1-9 scale; 6 = acceptable, 9 = dark dense green turf.<sup>b</sup>WBA = weeks before aeration.<sup>c</sup>WAA = weeks after aeration.

ns = not significant.