Effects of Natural Fertilizers on Irrigated and Non-Irrigated Turfgrass

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Introduction

An important aspect of turf management is having a proper fertility program. Fertilizers are important for plant health and overall turf quality. Recently there has been an increased demand for natural fertilizers. Natural fertilizers have many benefits compared with synthetic fertilizers. Natural fertilizers often are slow-release fertilizers and contain secondary or trace nutrients, and they can improve soil structure and water holding capacity. The objective of this study is to compare the effects of natural fertilizers on turfgrass with a conventional synthetic fertilizer. This is the first year of a two-year study.

Materials and Methods

Research was conducted at the Iowa State University Horticulture Research Station in Ames, Iowa, on established Kentucky bluegrass (*Poa pratensis* L.) plots growing on a native soil rootzone. The experiment was duplicated under irrigated and non-irrigated conditions. Turf was maintained at a three-inch mowing height.

The experimental design was a randomized complete block with four replications. Treatments included: Certain Turf, Certain Turf + Weed Control, Certain Turf + Mycro., Milorganite, and Urea. All treatments were applied at 0.75 lb N/1,000 ft^2 per application. Three different application timings are used in the study: fall only (0.75 lb N/1,000 ft^2 for the year), fall + spring (1.5 lb N/1,000 ft^2 for the year), and fall + spring + spring (2.25 lb N/1,000 ft^2 for the year). The fall treatments were applied September 19, 2018, and the spring applications will be done next year when growing conditions are appropriate.

Weekly digital images were collected using a light box and digital camera. Digital image analysis (DIA) was performed to get percent green cover (0-100%), dark green color index (DGCI) (0-1 value, 1 being dark turf), color (0-9 scale, with 9 = dark green turf and 6 or greater = acceptable), and quality rating (1-9 scale with 6 or greater = acceptable). Soil moisture was collected using a FieldScout TDR Meter with three-inch probes. Clippings were collected, dried, and weighed November 14, 2018. Data was analyzed using SAS at the 0.05 level of significance and means separated with Fishers LSD.

Results and Discussion

Significant differences in the irrigated location were found on four of the seven rating dates for percent green cover (data not shown). DGCI (data not shown) and quality ratings were significant on one rating date. In the non-irrigated location, significant differences were found on two of the seven rating dates for percent green cover, and one rating date for DGCI, color, soil moisture, clippings, and quality ratings (percent green color, DGCI, color, and soil moisture data not presented). Although there were significant differences in percent green cover, DGCI, color, and soil moisture, the significant differences were minimal and all treatments were above acceptable standards.

On the significant rating date for turf quality on the irrigated study, only the control had a quality rating less than the commercially acceptable standard (Table 1). Treatments that received fertilizer had acceptable turf quality. All of the treatments, including the control, provided acceptable quality for the non-irrigated study (Table 2). On the rating date with a significant difference, all of the treatments that received fertilizer had a significantly higher quality rating compared with the control.

There was no significant difference in dry clipping weights on the irrigated study (Table 3). However, there was a significant difference in dry clipping weights on the non-irrigated study (Table 3). Only the Certain Turf + Mycro. treatments did not result in at least one higher clipping yield than the control. Many of the application timings still need to go out. This study will be continued in the spring and repeated next fall to help determine any treatment differences.

Table 1. Turf quality of Kentucky bluegrass after fall fertilizer applications under irrigated conditions, 2018.

Treatment	Application timing[a]	Weeks after fall fertilizer application						
		0	1	2	3	4	5	6
Control	-	7.4[b]	5.6	6.0	6.0	5.6	7.0	6.9
Certain Turf	1	7.5	6.3	6.8	6.5	6.3	6.8	7.3
Certain Turf	2	7.8	6.3	6.0	6.5	6.5	6.8	6.5
Certain Turf	3	6.9	6.5	7.3	7.6	7.5	7.6	7.4
Certain Turf + Weed Control	1	6.4	6.8	6.8	6.6	6.0	6.6	6.8
Certain Turf + Weed Control	2	6.4	6.1	6.4	6.5	6.9	5.9	6.5
Certain Turf + Weed Control	3	6.9	6.8	6.6	7.0	6.3	7.1	7.5
Certain Turf + Mycro.	1	7.3	6.5	7.1	6.8	7.1	6.4	6.9
Certain Turf + Mycro.	2	6.9	7.5	7.3	6.3	7.0	7.1	7.3
Certain Turf + Mycro.	3	6.8	5.9	6.6	6.4	7.1	6.8	6.6
Milorganite	1	6.9	6.1	7.1	7.1	7.0	7.1	7.0
Milorganite	2	7.0	6.5	7.3	6.5	6.8	6.5	6.9
Milorganite	3	7.3	6.8	7.4	7.1	6.6	6.5	6.9
Urea	1	7.9	7.0	7.4	7.0	6.9	6.9	6.8
Urea	2	6.5	7.0	7.0	6.5	6.8	6.5	6.8
Urea	3	7.0	7.1	7.1	7.0	7.4	7.1	7.4
LSD (0.05)[c]		NS[d]	NS	NS	NS	1.01	NS	NS

[a]Application times: 1 = fall only (0.75 lb nitrogen/1,000 ft^2 year); 2 = fall + spring (1.5 lb nitrogen/1,000 ft^2 year); and 3 = fall + spring + spring (2.25 lb nitrogen/1,000 ft^2 year).

[b]Turf quality ratings 1-9, 1 = poorest or dead turf and 9 = outstanding or ideal turf. A rating of 6 or above is acceptable.

[c]Means were separated using Fishers LSD.

[d]NS = not significant at the alpha level = 0.05.

Table 2. Turf quality of Kentucky bluegrass after fall fertilizer applications under non-irrigated conditions, 2018.

Treatment	Application timing[a]	Weeks after fall fertilizer application						
		0	1	2	3	4	5	6
Control	-	7.0[b]	7.9	6.4	6.1	6.3	7.3	6.1
Certain Turf	1	6.4	7.8	6.9	7.4	7.0	7.1	7.3
Certain Turf	2	6.6	7.6	7.0	7.6	6.8	7.0	6.8
Certain Turf	3	6.4	7.9	6.9	7.5	6.6	6.1	6.5
Certain Turf + Weed Control	1	6.3	7.9	7.3	7.8	6.1	6.6	6.4
Certain Turf + Weed Control	2	6.6	8.3	7.5	8.0	6.3	6.9	7.3
Certain Turf + Weed Control	3	7.1	8.0	7.4	7.5	7.8	7.5	6.8
Certain Turf + Mycro.	1	7.0	7.9	7.4	7.4	6.6	7.0	6.4
Certain Turf + Mycro.	2	7.4	7.5	6.9	7.4	6.1	7.3	6.4
Certain Turf + Mycro.	3	7.3	8.0	6.9	7.3	7.1	6.5	6.9
Milorganite	1	6.5	8.1	7.3	7.0	6.6	6.6	5.8
Milorganite	2	6.3	7.3	7.0	7.5	7.4	6.9	6.3
Milorganite	3	7.0	8.0	7.6	7.4	6.4	7.9	6.3
Urea	1	6.5	8.1	7.0	7.4	8.1	7.1	6.6
Urea	2	7.0	7.6	7.6	7.6	6.9	6.8	6.8
Urea	3	6.4	8.1	7.4	7.5	6.4	7.3	6.4
LSD (0.05)[c]		NS[d]	NS	NS	NS	0.83	NS	NS

[a]Application times: 1 = fall only (0.75 lb nitrogen/1,000 ft^2 year); 2 = fall + spring (1.5 lb nitrogen/1,000 ft^2 year); and 3 = fall + spring + spring (2.25 lb nitrogen/1,000 ft^2 year).
[b]Turf quality ratings 1-9, 1 = poorest or dead turf and 9 = outstanding or ideal turf. A rating of 6 or above is acceptable.
[c]Means were separated using Fishers LSD.
[d]NS = not significant at the alpha level = 0.05.

Table 3. Dry clipping weights (g) after fall fertilizer applications, November 14, 2018.

Treatment	Application timing[a]	Irrigated plot	Non-irrigated plot
Control	-	2.43	4.93
Certain Turf	1	3.01	6.76
Certain Turf	2	3.15	6.71
Certain Turf	3	2.72	8.42
Certain Turf + Weed Control	1	2.94	8.95
Certain Turf + Weed Control	2	2.03	10.76
Certain Turf + Weed Control	3	2.73	8.38
Certain Turf + Mycro.	1	3.26	4.78
Certain Turf + Mycro.	2	2.77	5.41
Certain Turf + Mycro.	3	2.81	5.11
Milorganite	1	2.75	8.72
Milorganite	2	3.61	8.22
Milorganite	3	2.38	7.31
Urea	1	3.01	8.27
Urea	2	3.22	8.17
Urea	3	3.39	6.51
LSD (0.05)[b]		NS[c]	2.98

[a]Application times: 1 = fall only (0.75 lb nitrogen/1,000 ft^2 year); 2 = fall + spring (1.5 lb nitrogen/1,000 ft^2 year); and 3 = fall + spring + spring (2.25 lb nitrogen/1,000 ft^2 year).
[b]Means were separated using Fishers LSD.
[c]NS = not significant at the alpha level = 0.05.