Kentucky Bluegrass Fertilizer Study

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The purpose of this study was to evaluate the response of Kentucky bluegrass to several turf fertilizer formulations. The experimental plot was an established area of 'Park' Kentucky bluegrass at the Iowa State University Horticulture Research Station north of Ames, Iowa. The soil in this area was a Nicollet (fine-loamy, mixed, mesic Aquic Hapludoll) with 3.5% organic matter, a pH of 7.3, 6 ppm P and 85 ppm K. Irrigation was used to supplement rainfall and maintain the turf in good growing condition.

The experiment was arranged in a randomized complete block design. Individual plots were 5 x 5 ft and three replications were conducted. Three-foot barrier rows were placed between replications to facilitate taking clippings.

Natural fertilizers and commercial mixtures were included in this study in single and split applications (Table 1). There were 11 treatments including eight different fertilizers and an untreated control. Two Turfgo fertilizer formulations from Viridian Inc. containing ESN #2003 mini coated material were used (23-5-10 and 22-5-10). They were applied at an annual rate of 4 lb N/1000 ft^2 in split applications. Two Renaissance products from Renaissance Fertilizers Inc. were included. The 6-0-6 formulation was applied at a yearly rate of 4 lbs N/1000 ft^2 in split applications. The 8-2-6 mixture was applied at 2 and 3 lbs N/1000 ft^2 in single applications and at 4 lbs N/1000 ft^2 in split applications. Corn gluten meal from Grain Processing Inc., sustane (turkey manure), milorganite (processed sewage sludge), and Poly Plus sulfur coated urea (39-0-0) from LESCO Inc. also were included. They were applied at 4 lbs N/1000 ft^2 in split applications.

Prior to treatment the plot was mowed to a uniform height of 2 inches. A survey of the area was made before application and the bluegrass was found to be uniform in color and overall quality. The fertilizers were applied using plastic coated containers as 'shaker dispensers'. Initial applications were made June 3. Sequential applications were made August 8.

Fresh clipping weight and visual quality data was taken weekly beginning eight days after initial treatment. Turf quality was assessed using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality (Tables 2 and 3). Clipping weights were measured as grams fresh tissue and mowing height for the clippings was 2 inches (Tables 4 and 5).

Data were analyzed using the Statistical Analysis System (SAS) version 6.09 and the Analysis of Variance (ANOVA) procedure. Means comparisons were made with Fisher's Least Significant Difference (LSD) test.

There were significant differences in turf quality among the treatments on each of the 15 data collection dates. All fertilizers produced significantly higher quality bluegrass than the untreated controls from June 19 through September 12. During this period, the quality of all fertilized turf was above the lowest acceptable rating of '6' (Tables 3 and 4). Renaissance at 3 lbs N/1000 ft^2 consistently produced very good turf quality through August 8. Bluegrass treated with the two ESN #2003 products, corn gluten meal, and Renaissance (6-0-6) also exhibited good quality through August 8.

All bluegrass that received a sequential fertilizer treatment on August 8 had significantly higher quality than the untreated controls through October 3. Sulfur coated urea, the two ESN #2003 products, corn gluten meal, Renaissance (8-2-6) in split applications, and Renaissance (6-0-6) produced the best quality bluegrass (Table 2 and 3). Turf quality declined after August 8 in those plots that did not receive sequential applications.

Mean turf quality for all fertilized bluegrass was significantly better than the untreated controls. The two ESN #2003 products, sulfur coated urea, corn gluten meal and Renaissance (6-0-6) produced bluegrass with the best overall quality (Table 3).

Fresh clipping weights from treated bluegrass were significantly different from the untreated control for 13 weeks of the 15-week study (Tables 4 and 5). Significant differences among the fertilizer treatments also were found on each of these dates. Growth response to most of the products was maintained from June 11 through August 8 as shown by the clipping weights. On August 15, the clipping weights reflect a rapid growth response to the sequential applications of some of the materials including the two ESN #2003 formulations, sulfur coated urea, and Renaissance (6-0-6). By August 23, all turf receiving a sequential application exhibited substantial clipping increases as compared with the untreated controls and those not treated on August 8 (Table 3 and 4). This trend continued through the late summer and early fall.

Mean and total clipping weights for all of the fertilizers were significantly higher than the untreated controls (Table 5). ESN #2003 (22-5-10) produced the most clippings followed by ESN #2003 (23-5-10), sulfur coated urea, corn gluten meal, Renaissance (8-2-6) (treatment 7), and Renaissance (6-0-6).

Table 1. Rates and number of applications for fertilizer formulations used in the 1996 Kentucky Bluegrass Fertilizer Trial.

	Materials[1]	Yearly lbs N/1000 ft^2	Initial application lbs N/1000 ft^2	Sequential application lbs N/1000 ft^2
1.	Untreated control	NA	NA	NA
2.	Corn gluten meal (10% N)	4	2	2
3.	Sustane (5-2-4)	4	2	2
4.	Renaissance (6-0-6)	4	2	2
5.	Renaissance (8-2-6)	2	2	0
6.	Renaissance (8-2-6)	3	3	0
7.	Renaissance (8-2-6)	4	2	2
8.	Milorganite (6-2-0)	4	2	2
9.	ESN #2003 (23-5-10)	4	2	2
10.	ESN #2003 (22-5-10)	4	2	2
11.	Sulfur coated urea(39-0-0) (LESCO Poly Plus™)	4	2	2

[1] Initial applications were made on June 3 and sequential on August 8.

Table 2. Visual quality[1] of Kentucky bluegrass treated with fertilizer materials in the 1996 Kentucky Bluegrass Fertilizer Trial (data through August 15).

	Materials[2]	Rate[3] lbs N/1000 ft^2	June 11	June 19	June 25	July 2	July 12	July 23	July 30	Aug 8	Aug 15
1.	Untreated control	NA	6	5	5	5	6	6	6	6	6
2.	Corn gluten meal (10% N)	4-split	6	7	9	8	8	8	8	8	8
3.	Sustane (5-2-4)	4-split	7	7	7	6	7	7	7	7	8
4.	Renaissance (6-0-6)	4-split	7	9	8	7	7	8	8	8	9
5.	Renaissance (8-2-6)	2	7	8	8	7	7	8	8	8	6
6.	Renaissance (8-2-6)	3	7	9	9	9	9	9	9	9	7
7.	Renaissance (8-2-6)	4-split	7	7	8	7	7	8	8	7	8
8.	Milorganite (6-2-0)	4-split	7	7	7	6	7	7	7	7	8
9.	ESN #2003 (23-5-10)	4-split	8	8	8	7	8	8	8	8	9
10.	ESN #2003 (22-5-10)	4-split	9	9	8	8	8	9	8	8	9
11.	Sulfur coated urea (39-0-0)	4-split	8	8	7	7	7	7	7	7	9
	$LSD_{0.05}$		1	1	1	1	1	1	1	1	1

[1] Visual quality was assessed using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality.

[2] Initial applications were made on June 3 and sequential on August 8.

[3] Treatments 5 and 6 received only 1 application of fertilizer, the other treatments were made in split applications of 2 lbs.

Table 3. Visual quality[1] of Kentucky bluegrass treated with fertilizer materials in the 1996 Kentucky Bluegrass Fertilizer Trial (data from August 23 through October 3).

	Materials[2]	Rate[3] lbs N/1000 ft^2	Aug 23	Aug 29	Sept 5	Sept 12	Sept 19	Oct 3	Mean quality
1.	Untreated control	NA	6	6	5	5	5	5	6
2.	Corn gluten meal (10% N)	4-split	9	9	9	8	7	8	8
3.	Sustane (5-2-4)	4-split	9	8	7	7	7	7	7
4.	Renaissance (6-0-6)	4-split	9	8	8	7	7	7	8
5.	Renaissance (8-2-6)	2	7	7	6	6	6	6	7
6.	Renaissance (8-2-6)	3	7	7	6	6	5	5	8
7.	Renaissance (8-2-6)	4-split	9	9	8	8	7	7	8
8.	Milorganite (6-2-0)	4-split	8	8	8	7	7	7	7
9.	ESN #2003 (23-5-10)	4-split	9	9	9	8	7	8	8
10.	ESN #2003 (22-5-10)	4-split	9	9	9	9	8	9	8
11.	Sulfur coated urea (39-0-0)	4-split	9	9	9	9	8	9	8
	$LSD_{0.05}$		1	1	1	1	1	1	0.3

[1] Visual quality was assessed using a 9 to 1 scale: 9 = best quality, 6 = lowest acceptable quality, and 1 = poorest quality.

[2] Initial applications were made on June 3 and sequential on August 8.

[3] Treatments 5 and 6 received only 1 application of fertilizer, the other treatments were made in split applications of 2 lbs.

Table 4. Clipping weights[1] of Kentucky bluegrass treated with fertilizer materials in the 1996 Kentucky Bluegrass Fertilizer Trial (data from June 11 through August 23).

	Materials[2]	Rate[3] lbs N/ 1000 ft^2	June 11	June 19	June 25	July 2	July 12	July 23	July 30	Aug 8	Aug 15	Aug 23
1.	Untreated control	NA	171	105	102	69	40	66	63	65	61	72
2.	Corn gluten meal (10% N)	4-split	184	172	203	107	94	198	146	157	163	305
3.	Sustane (5-2-4)	4-split	199	180	155	68	56	121	109	112	134	239
4.	Renaissance (6-0-6)	4-split	206	263	207	88	75	170	130	128	172	348
5.	Renaissance (8-2-6)	2	236	223	209	108	81	188	140	154	114	118
6.	Renaissance (8-2-6)	3	183	238	261	110	93	260	179	166	135	133
7.	Renaissance (8-2-6)	4-split	207	198	183	94	66	152	126	128	155	292
8.	Milorganite (6-2-0)	4-split	223	196	152	80	71	140	114	133	142	246
9.	ESN #2003 (23-5-10)	4-split	241	302	197	94	84	211	144	153	233	377
10.	ESN #2003 (22-5-10)	4-split	279	303	204	86	101	224	151	150	235	415
11.	Sulfur coated urea (39-0-0)	4-split	267	273	138	78	73	161	124	135	188	360
	$LSD_{0.05}$		NS	51	59	NS	17	30	18	32	24	40

[1] Clipping weights are expressed as grams fresh weight.
[2] Initial applications were made on June 3 and sequential on August 8.
[3] Treatments 5 and 6 received only 1 application of fertilizer, the other treatments were made in split applications of 2 lbs.
NS = means are not significantly different at the 0.05 level.

Table 5. Clipping weights[1] of Kentucky bluegrass treated with fertilizer materials in the 1996 Kentucky Bluegrass Fertilizer Trial (data from August 29 through October 3).

	Materials[2]	Rate[3] lbs N/1000 ft^2	Aug 29	Sept 5	Sept 12	Sept 19	Oct 3	Mean weight	Total clipping weight
1.	Untreated control	NA	48	46	48	25	24	67	1003
2.	Corn gluten meal (10% N)	4-split	187	153	120	63	72	155	2325
3.	Sustane (5-2-4)	4-split	126	108	85	46	49	119	1786
4.	Renaissance (6-0-6)	4-split	173	137	101	50	57	154	2304
5.	Renaissance (8-2-6)	2	73	77	66	35	42	124	1864
6.	Renaissance (8-2-6)	3	76	82	73	47	41	138	2076
7.	Renaissance (8-2-6)	4-split	167	152	118	55	62	144	2154
8.	Milorganite (6-2-0)	4-split	135	123	92	54	58	131	1959
9.	ESN #2003 (23-5-10)	4-split	182	166	130	69	83	178	2666
10.	ESN #2003 (22-5-10)	4-split	201	170	145	71	83	188	2818
11.	Sulfur coated urea (39-0-0)	4-split	184	166	136	71	87	163	2438
	$LSD_{0.05}$		20	23	14	9	8	16	247

[1] Clipping weights are expressed as grams fresh weight.
[2] Initial applications were made on June 3 and sequential on August 8.

[3] Treatments 5 and 6 received only 1 application of fertilizer, the other treatments were made in split applications of 2 lbs.

NS = means are not significantly different at the 0.05 level.