

Assessment of Various Fertilizers on Kentucky Bluegrass Turf

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Summary

This trial evaluated various new fertilizer formulations that were developed by All Treat Farms. The Scott's EcoSense 10-0-5 and the All Treat 24-0-7 fertilizer consistently produced the best turf colour. The Scott's EcoSense 10-0-5, the 10-0-6 and the 24-0-7 fertilizers were top rated for quality on all rating dates. The All Treat 24-0-7 and Scott's Turf Builder 34-0-7 consistently had the highest clipping yield. As a percent reduction from the highest total clipping yield (All Treat 24-0-7), Scott's Turf Builder was 12% lower, 10-0-6 fertilizer was 28% lower, Scott's EcoSense was 34% lower, All Treat Pelletized Compost was 43% lower, and Time Sav'r Top Dresser and the untreated control were 70% lower. Those fertilizers that produced the highest clipping yields (All Treat 24-0-7 and Scott's 34-0-7) also had the greatest thatch layer depth and the highest organic matter content. There were no differences between treatments when volumetric water content of the soils was compared.

Objective

To evaluate various fertilizers from All Treat Farms for turfgrass quality, clipping yield, thatch reduction, and soil moisture content.

Methodology

The Kentucky bluegrass test site was located at the Prairie Turfgrass Research Centre in Olds, Alberta. Plots, which measured 1 x 2 metres, were established in a complete randomized block design with four replicates. The trial commenced June 2, 2010 and products were applied every six weeks at a rate of application of 0.5kg of nitrogen per 100m² (kg N/100m²). Actual dates of application were June 2, July 14, and Aug 25, 2010.

The individual treatments were:

Table 1 – Treatments, application rate and schedule applied to Kentucky bluegrass.

Product	Application Rate
1. Untreated control	0.5kg N/100m ² every six weeks
2. Time Sav'r Top Dresser 2.78%N	0.5kg N/100m ² every six weeks
3. All treat Pelletized Compost 2.78%N	0.5kg N/100m ² every six weeks
4. All Treat 24-0-7 50% slow release	0.5kg N/100m ² every six weeks
5. All Treat 10-0-6	0.5kg N/100m ² every six weeks
6. Scotts Eco-Sense 10-0-5	0.5kg N/100m ² every six weeks
7. Scott Turf builder 34-0-7	0.5kg N/100m ² every six weeks

Data collections:

Colour and quality, as well as clipping yields, were rated weekly beginning June 8.

For colour ratings, 1 indicated a brown dormant turf and 9 indicated a dark green turf. The individual treatments were also assessed for superior colour, i.e. a treatment was considered superior when it had an 'a' ranking.

Density was combined with colour to determine quality ratings. Density, which is a subjective rating of shoots per unit of area, was based on 1 was poor density and 9 was superior density.

Clippings were collected with a reel mower that made one pass down the centre of each plot. Clippings were then dried for 48 hours at 70°C in a drying oven and weighed. Clipping yields were recorded as grams of clippings per square meter per week. In order to determine the consistency of release of the various fertilizers the mean standard deviation was determined. Mean standard deviation is a measurement in grams of the deviation from the mean value based on the weekly clipping yields. A consistent release of nitrogen would result in low values for mean standard deviation.

Percent volumetric water content

In order to determine the volumetric water content, three moisture readings were collected in three locations per plot (bottom, middle, and top) with a moisture meter (Campbell Scientific Hydro-Sense TDR 1000). Data was collected on two separate occasions, June 30 and August 25.

Thatch depth measurement

Thatch is the intermingled organic layer of dead and living leaves, stems, and roots of grasses that develops between the turf canopy of green vegetation (verdure) and the soil surface. The thatch depth was measured from an extracted 5 cm diameter turfgrass plug by cutting away the verdure, placing a round 1 kg weight on the exposed thatch surface and measuring the depth of thatch with a ruler. Field sampling occurred prior to the application of the treatments on June 2 and then again at the end of trial season on October 19.

Measuring percent organic matter

Field sampling for organic matter content occurred prior to the application of the treatments on June 2 and then again at the end of trial on October 19.

Percent organic matter was determined by loss on ignition (ASTM D7348). Two 6cm turf plugs were collected from each plot. The verdure and thatch were removed from the plugs at the soil-thatch interface. The turf plugs were ground to a consistent sized particle. The samples were then oven dried at 105°C for 2 hours to remove any surface moisture. Ten gram lots from each plot were weighed and placed in a muffle furnace at 360°C for 2 hours. The samples were allowed to cool to 105°C before being weighed once more.

The percent organic matter was determined using the following formula;

$$\frac{\text{Initial sample wt} - \text{Final sample wt.}}{\text{Initial sample wt.}} \times 100$$

Statistical analysis

Generated data was first analyzed using an Analysis of Variance (ANOVA) test. Where statistically significant treatment differences are present, least significant difference (LSD) values are presented at the bottom of each table. Treatment differences that are greater than the LSD value indicate a strong probability that the differences are as a result of the treatment and did not occur by chance. Therefore, within a column, if the same letter follows a number, there is no significant difference between treatments.

Results

Turf Colour

The Scott's EcoSense 10-0-5 and the 24-0-7 fertilizer were the most consistent products for turf colour and were highest rated on each of the rating dates. Following application of the products, no noticeable colour change had occurred by one week after treatment (week 1). However, by week two (13 days after treatment) colour had improved considerably for all treatments except for the Time Sav'r Top Dresser when compared with the untreated control. The time Sav'r Top Dresser did not have better colour than the untreated control on any of the rating dates.

Table 1 - Turf colour rated on a weekly basis, 1-9 scale.

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	1	2	3	4	5	6
	1 – 9 scale					
Untreated Control	6.0a	6.0bc	6.0c	6.2de	6.0a	6.0b
Time Sav'r Top Dresser 2.78%N	6.0a	6.0b	6.2c	6.0e	6.2a	6.0b
All Treat Pelletized Compost 2.78%N	6.0a	6.5ab	6.5bc	6.5cde	6.5a	6.5ab
All Treat 24-0-7	6.0a	7.0a	7.2a	7.5a	6.7a	7.0a
All Treat 10-0-6	6.0a	6.7a	7.5a	6.7bcd	6.7a	6.5ab
Scotts Eco-Sense 10-0-5	6.0a	6.7a	7.5a	7.2ab	6.7a	7.0a
Scotts Turf Builder 34-0-7	6.0a	7.0a	7.0ab	7.0abc	6.5a	6.7a
LSD _{0.05} =	n/s	0.5	0.5	0.6	n/s	0.5

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	7	8	9	10	11	12
	1 – 9 scale					
Untreated Control	6.0d	7.5a	7.0c	7.0a	7.0a	7.0a
Time Sav'r Top Dresser 2.78%N	6.2cd	7.0a	7.0c	7.0a	7.0a	7.0a
All Treat Pelletized Compost 2.78%N	6.7bc	7.2a	7.2bc	7.2a	7.0a	7.0a

All Treat 24-0-7	7.5a	7.5a	8.0a	7.2a	7.0a	7.0a
All Treat 10-0-6	7.5a	7.7a	7.7ab	7.0a	7.0a	7.0a
Scotts Eco-Sense 10-0-5	7.0ab	7.7a	7.7ab	7.2a	7.0a	7.0a
Scotts Turf Builder 34-0-7	7.0ab	7.7a	7.7ab	7.0a	7.0a	7.0a
LSD _{0.05} =	0.5	n/s	0.5	n/s	n/s	n/s

	Week				Superior Turf Color
	13	14	15	16	
	————— 1 – 9 scale —————				
Untreated Control	7.0a	7.0a	6.0c	6.0b	8 out of 16 weeks
Time Sav’r Top Dresser 2.78%N	7.0a	7.0a	6.5bc	6.2b	8 out of 16 weeks
All Treat Pelletized Compost 2.78%N	7.0a	7.0a	7.0ab	7.0a	12 out of 16 weeks
All Treat 24-0-7	7.0a	7.0a	7.2a	7.0a	16 out of 16 weeks
All Treat 10-0-6	7.0a	7.0a	7.5a	7.0a	15 out of 16 weeks
Scotts Eco-Sense 10-0-5	7.0a	7.0a	7.5a	7.2 a	16 out of 16 weeks
Scotts Turf Builder 34-0-7	7.0a	7.0a	7.0ab	6.7a	14 out of 16 weeks
LSD _{0.05} =	n/s	n/s	0.6	0.3	

* Within a column, values followed by the same letter are not significantly different at p=0.05.

Turf Quality

The Scott’s EcoSense 10-0-5, the 10-0-6 and the 24-0-7 fertilizers were top rated for quality on all of the 16 rating dates. The Scott’s Turf Builder 34-0-7 was considered to be similar to the top rated fertilizers on 14 of the 16 rating dates. Turf quality for the Time Sav’r Top Dresser and the All Treat Pelletized Compost was similar to the untreated control.

Table 2 - Turf quality rated on a weekly basis, 1-9 scale.

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	1	2	3	4	5	6
	————— 1 – 9 scale —————					
Untreated Control	6.7a	6.7c	6.7c	7.0cd	7.0a	7.2cd
Time Sav’r Top Dresser 2.78%N	6.8a	6.7c	6.9bc	6.9d	7.0a	7.1d
All Treat Pelletized Compost 2.78%N	6.5a	6.8bc	6.9bc	7.1bcd	7.0a	7.3bcd

All Treat 24-0-7	6.6a	7.0a	7.3a	7.6a	7.2a	7.7a
All Treat 10-0-6	6.6a	6.9ab	7.4a	7.3abc	7.2a	7.5abc
Scotts Eco-Sense 10-0-5	6.5a	6.9ab	7.4a	7.4ab	7.2a	7.7a
Scotts Turf Builder 34-0-7	6.5a	7.0a	7.1ab	7.0cd	7.1a	7.6ab
LSD _{0.05} =	n/s	0.1	0.3	0.3	n/s	0.3

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	7	8	9	10	11	12
	————— 1 – 9 scale —————					
Untreated Control	7.0d	7.6a	7.9b	7.6a	7.7a	7.7a
Time Sav'r Top Dresser 2.78%N	7.3c	7.6a	7.9b	7.7a	7.7a	7.7a
All Treat Pelletized Compost 2.78%N	7.6b	7.7a	8.0b	7.7a	7.7a	7.7a
All Treat 24-0-7	7.9a	7.6a	8.3a	7.7a	7.7a	7.7a
All Treat 10-0-6	7.8ab	7.9a	8.2a	7.7a	7.7a	7.7a
Scotts Eco-Sense 10-0-5	7.7ab	7.8a	8.2a	7.6a	7.7a	7.7a
Scotts Turf Builder 34-0-7	7.7ab	7.9a	8.2a	7.7a	7.7a	7.7a
LSD _{0.05} =	0.2	n/s	0.1	n/s	n/s	n/s

Treatments applied at 0.5kg N/100m ² every six weeks	Week				Superior Turf Quality
	13	14	15	16	
	————— 1 – 9 scale —————				
Untreated Control	7.7a	7.7a	7.2d	7.2c	8 out of 16 weeks
Time Sav'r Top Dresser 2.78%N	7.7a	7.7a	7.5cd	7.4c	8 out of 16 weeks
All Treat Pelletized Compost 2.78%N	7.7a	7.7a	7.7bc	7.7b	8 out of 16 weeks
All Treat 24-0-7	7.7a	7.7a	7.9ab	7.8ab	16 out of 16 weeks
All Treat 10-0-6	7.7a	7.7a	8.1a	8.0a	16 out of 16 weeks
Scotts Eco-Sense 10-0-5	7.7a	7.8a	8.0ab	7.8ab	16 out of 16 weeks
Scotts Turf Builder 34-0-7	7.7a	7.7a	7.8abc	7.7b	14 out of 16 weeks
LSD _{0.05} =	n/s	n/s	0.3	0.2	

* Within a column, values followed by the same letter are not significantly different at p=0.05.

Clipping Yield

The All Treat 24-0-7 fertilizer had the highest total clipping yield of all the fertilizers. As a percent reduction from the highest total clipping yield, Scott's Turf Builder was 12% lower, 10-0-6 fertilizer was 28% lower, Scott's EcoSense was 34% lower, All Treat Pelletized Compost was 43% lower, and Time Sav'r Top Dresser and the untreated control were 70% lower. The All Treat 24-0-7 and Scott's Turf Builder 34-0-7 consistently had the highest clipping yield. The greatest variation in clipping yield, as measured by standard deviation, was with the All Treat 24-0-7.

Table 3 - Clipping yields measured on a weekly basis, grams of clipping per m².per week.

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	1	2	3	4	5	6
	g/m ²					
Untreated Control	3.5c	5.0b	1.2b	1.1c	2.2d	2.1b
Time Sav'r Top Dresser 2.78%N	4.2bc	4.2b	1.3b	1.6c	2.2d	2.9b
All Treat Pelletized Compost 2.78%N	3.4c	5.6b	1.8b	1.8bc	3.5cd	3.3b
All Treat 24-0-7	6.5ab	11.0a	5.2a	6.2a	8.6ab	9.2a
All Treat 10-0-6	6.8a	10.1a	5.1a	5.2a	6.2bc	5.0b
Scotts Eco-Sense 10-0-5	7.5a	11.5a	5.8a	4.1ab	6.8ab	4.8b
Scotts Turf Builder 34-0-7	8.5a	11.2a	5.7a	5.8a	9.4a	9.0a
LSD _{0.05} =	2.3	3.4	1.9	2.3	2.7	3.8

Treatments applied at 0.5kg N/100m ² every six weeks	Week					
	7	8	9	10	11	12
	g/m ²					
Untreated Control	8.0cd	3.3d	7.3c	3.9c	5.2a	5.8c
Time Sav'r Top Dresser 2.78%N	7.1d	4.2cd	6.8c	3.5c	6.4a	5.4c
All Treat Pelletized Compost 2.78%N	16.0bcd	9.4bc	15.3bc	8.7bc	11.6a	11.0ab
All Treat 24-0-7	27.7a	18.9a	25.5a	14.3a	15.1a	14.9a
All Treat 10-0-6	22.0ab	12.2b	15.3bc	7.4bc	9.8a	10.0bc
Scotts Eco-Sense 10-0-5	17.1bcd	8.7bcd	11.5bc	5.8bc	9.3a	9.6bc
Scotts Turf Builder 34-0-7	22.8ab	12.8b	19.5ab	9.5ab	12.3a	13.3ab
LSD _{0.05} =	9.6	5.8	8.8	5.3	n/s	4.7

Treatments applied at 0.5kg N/100m ² every six weeks	Week				Total Clipping Yield (% reduction)	Std. Dev.
	13	14	15	16		
	g/m ²					
Untreated Control	5.6c	4.2a	1.8b	0.8a	61.0g (70%)	2.2
Time Sav'r Top Dresser 2.78%N	5.7c	3.7a	2.1b	0.7a	62.0g (69%)	2.0
All Treat Pelletized Compost 2.78%N	12.0abc	7.3a	4.3b	0.8a	115.8g (43%)	4.9
All Treat 24-0-7	18.1a	8.4a	10.1a	1.5a	201.2g (0%)	7.3
All Treat 10-0-6	10.9bc	8.2a	9.3a	1.0a	144.5g (28%)	4.8
Scotts Eco-Sense 10-0-5	9.1bc	7.0a	12.1a	2.0a	132.7g (34%)	3.7
Scotts Turf Builder 34-0-7	14.0ab	9.5a	12.5a	2.1a	177.9g (12%)	5.1
	LSD _{0.05} =	6.8	n/s	4.0	n/s	

* Within a column, values followed by the same letter are not significantly different at p=0.05.

Volumetric Water Content

There were no differences between the various treatments with regard to volumetric water content, a measured of the soil's ability to hold moisture.

Table 4 - Volumetric water content measured as a percent.

Treatments applied at 0.5kg N/100m ² every six weeks	Sampling dates	
	June 2 nd	Oct 19 th
	%	
Untreated Control	66.7a	89.2a
Time Sav'r Top Dresser 2.78%N	62.0a	91.7a
All Treat Pelletized Compost 2.78%N	61.7a	88.5a
All Treat 24-0-7	60.5a	87.5a
All Treat 10-0-6	64.2a	90.2a
Scotts Eco-Sense 10-0-5	61.5a	89.7a
Scotts Turf Builder 34-0-7	63.5a	87.5a
	LSD _{0.05} =	n/s

* Within a column, values followed by the same letter are not significantly different at p=0.05.

Soil Organic Matter Content

There was an increase in soil organic matter content between the initial sample collection and the final collection. However, differences in organic matter content were not significantly different when the various treatments were compared. The fertilizer that showed the greatest increase in organic matter content was also the fertilizer that had the highest clipping yield, All Treat 24-0-7.

Table 5 - Soil organic matter content measured as a percent.

Treatments applied at 0.5kg N/100m ² every six weeks	Sampling dates		Change in Soil organic matter content
	June 2 nd	Oct 19 th	
	———— % ————		
Untreated Control	10.2a	10.4a	+1.9%
Time Sav'r Top Dresser 2.78%N	10.0a	10.8a	+8.0%
All Treat Pelletized Compost 2.78%N	10.0a	10.5a	+5.0%
All Treat 24-0-7	9.6a	11.6a	+20.8%
All Treat 10-0-6	9.9a	10.2a	+3.0%
Scotts Eco-Sense 10-0-5	10.4a	10.5a	+0.9%
Scott Turf builder 34-0-7	9.5a	10.3a	+8.0%
	LSD _{0.05} =	n/s	n/s

* Within a column, values followed by the same letter are not significantly different at p=0.05.

Thatch Depth

There were differences between treatments for thatch depth on the October 19 rating date. However, it was difficult to determine whether any of these differences were related to the treatments. Further evaluations may be necessary to determine if the treatments will have any effect on thatch layer depth.

Table 6 - Depth of thatch layer measured in mm and percent change.

Treatments applied at 0.5kg N/100m ² every six weeks	Sampling dates		Change in depth of thatch layer
	June 2 nd	Oct 19 th	
	———— mm ————		
Untreated Control	7.2a	6.5c	-9.7%
Time Sav'r Top Dresser 2.78%N	9.5a	7.6abc	-20.0%
All Treat Pelletized Compost 2.78%N	8.2a	6.7c	-18.2%
All Treat 24-0-7	9.5a	7.0bc	-26.3%
All Treat 10-0-6	10.2a	10.7a	+4.9%

Scotts Eco-Sense 10-0-5	8.0a	5.7c	-28.7%
Scott Turf builder 34-0-7	10.2a	10.0ab	-1.9%
	LSD _{0.05} =	n/s	3.2

* Within a column, values followed by the same letter are not significantly different at p=0.05.