

The Evaluation of Various Controlled Release Fertilizers for Use on Turf

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Summary

The objective of this trial was to evaluate various fertilizers for their effect on growth of Kentucky bluegrass. As expected, urea produced the highest colour ratings and clipping yields, and was equal to Lebanon 22-5-12 (six week interval) for quality ratings. Lebanon 22-5-12 (six week interval) produced similar colour ratings to the urea in the first six weeks, but was significantly lower following the second application of fertilizer. Quality ratings showed a similar trend. Clipping yields were highest for urea. Clipping yields dropped off significantly for the Lebanon 22-5-12 from week seven to twelve when only applied once. The Agrium Type I and Type II performed similarly throughout.

Introduction

Previous research conducted at the Prairie Turfgrass Research Centre has shown that temperature is one of the greatest factors in determining the nitrogen release pattern of fertilizers. The research has shown that, because of our cool climate, fertilizers may react very differently than what is reported in the literature. This trial was initiated in order to evaluate various fertilizers for their effects on growth within the cool climate of Alberta.

Methodology

Plots were laid out on a Kentucky bluegrass/fescue area at the Prairie Turfgrass Research Centre located at Olds College, Olds, Alberta. Plot sizes were 1.5 by 5 metres and laid out in a Randomized Complete Block Design. Individual treatments were replicated three times. The fertilizers were compared against two controls; one that was not treated and one that was fertilized with a 100% water soluble nitrogen source, urea.

Previous trials have shown that a water soluble and readily available nitrogen source, such as urea, produces a rapid colour change and increased clipping yield within a week after application. However, fluctuations in growth are also apparent and these wide fluctuations are considered to be detriment to good turf. For this reason, urea was used as a treated control or industry standard to which all fertilizers were compared.

Applications of the fertilizers were made six weeks apart on June 21, August 2 and September 14. There was one exception, as one application of Lebanon 22-5-12 was applied 12 weeks apart. Application rates were 0.5kg N/100 m².

Fertilizers included in this trial were as follows:

- 1) Untreated control – no fertilizer applied
- 2) Treated control – urea
- 3) Lebanon 22-5-12 (six week interval)
- 4) Lebanon 22-5-12 (twelve week interval)
- 5) Agrium Type I 43-0-0 (60 day release)
- 6) Agrium Type II 43-0-0 (90 day release)

Colour and quality ratings as well as clipping yields were collected weekly. The National Turfgrass Evaluation Program rating system of rating was used for colour. In this study, 1 indicated a brown dormant turf and 9 indicated a dark green turf colouration. Density and area cover ratings were combined with colour to determine quality ratings. Density ratings are 1 is poor density and 9 is superior density. Density is a subjective rating of shoots per unit area. The area cover rating is described as the area covered by turf and is rated on a 1-9 basis where 9 equals complete cover and 1 indicates a complete lack of cover. Bare areas or weed encroachment reduced the rating values. Clippings were collected with a reel mower that made one pass down the centre of each plot. Clippings were dried for 48 hours and weighed to give a value for clipping yield.

Results were evaluated for those treatments that were consistently the best, those treatments that were consistently better than the untreated control plots, and those treatments that were comparable to the treated control, urea.

Results

Colour ratings were collected in order to determine initial green-up, best colour ratings, and those treatments that showed consistently better colour than the untreated control (Table 1). Those fertilizers that displayed good initial green-up were urea and Lebanon 22-5-12 (six week interval). The best colour ratings were achieved with the application of urea, Lebanon 22-5-12 (six week interval), and Agrium Type II. Those fertilizers that consistently showed better colour than the unfertilized control were, once again, urea, Lebanon 22-5-12 (six-week interval), and Agrium Type II. Lebanon 22-5-12 (six week interval) produced similar colour ratings to the urea in the first six weeks, but was significantly lower following the second application of fertilizer.

Table 1 – Colour ratings for various fertilizers.

	28-Jun	6-Jul	12-Jul	18-Jul	25-Jul	1-Aug
CONTROL	4.667 BC	4.333 C	4.667 C	4.667 C	5.667 C	4.667 B
Urea (46-0-0)	6.667 A	6.667 A	7.000 A	6.667 A	8.000 A	6.667 A
Lebanon (22-5-12) 6wk Interval	5.667 AB	6.000 AB	6.667 AB	6.333 AB	7.000 AB	6.333 A
Lebanon (22-5-12) 12wk Interval	4.667 BC	5.000 BC	5.667 BC	5.000 BC	5.667 C	5.333 AB
Agrium Type I (43-0-0)	4.333 C	5.333 BC	5.667 BC	5.667 ABC	7.000 AB	6.667 A
Agrium Type II (43-0-0)	4.667 BC	5.000 BC	6.000 AB	6.000 ABC	7.000 AB	6.667 A
LSD value	1.014	1.075	1.185	1.585	1.132	1.453

Values followed by the same letter are not significantly different at $p=0.05$.

	8-Aug	15-Aug	22-Aug	31-Aug	7-Sep	13-Sep
CONTROL	4.667 C	4.000 D	4.000 D	4.000 D	4.000 D	4.000 C
Urea (46-0-0)	8.000 A	7.667 A	7.667 A	7.667 A	7.000 A	7.333 A
Lebanon (22-5-12) 6wk Interval	7.000 AB	6.333 B	6.000 B	5.667 C	5.000 C	6.333 B
Lebanon (22-5-12) 12wk Interval	5.000 C	4.333 D	4.333 CD	4.000 D	4.000 D	4.667 C
Agrium Type I (43-0-0)	6.333 B	6.667 B	6.333 B	6.667 B	6.333 B	6.667 AB
Agrium Type II (43-0-0)	6.333 B	5.333 C	6.333 B	6.667 B	6.000 B	6.667 AB
LSD value	1.002	0.9380	0.8679	0.5927	0.3898	0.2412

Values followed by the same letter are not significantly different at $p=0.05$.

Quality ratings were also evaluated on a weekly basis. The fertilizers that produced the best overall quality were urea and Lebanon 22-5-12 (six week interval) (Table 2). The Lebanon 22-5-12 (six week interval) produced similar quality ratings to the urea in the first seven weeks, but then was significantly lower following the second application of fertilizer.

Table 2 - Overall Quality ratings for various fertilizers.

	28-Jun	6-Jul	12-Jul	18-Jul	25-Jul	1-Aug
CONTROL	4.889 BC	4.667 C	5.111 D	5.000 C	5.889 B	5.000 C
Urea (46-0-0)	5.667 A	6.111 A	6.778 A	6.444 AB	7.556 A	6.556 AB
Lebanon (22-5-12) 6wk Interval	5.556 AB	6.000 AB	6.667 AB	6.444 AB	7.000 A	6.444 AB
Lebanon (22-5-12) 12wk Interval	4.667 C	5.111 BC	5.778 BCD	5.556 BC	5.889 B	5.778 BC
Agrium Type I (43-0-0)	4.222 C	5.000 C	5.556 CD	5.778 ABC	6.667 AB	6.556 AB
Agrium Type II (43-0-0)	4.778 C	4.889 C	5.778 BCD	5.778 ABC	7.000 A	6.667 A
LSD value	0.7094	0.9905	0.9662	1.0460	0.9464	0.8788

Values followed by the same letter are not significantly different at $p=0.05$

	8-Aug	15-Aug	22-Aug	31-Aug	7-Sep	13-Sep
CONTROL	5.667 C	5.444 D	5.111 D	5.444 D	5.778 D	5.333 B
Urea (46-0-0)	7.444 A	7.556 A	7.667 A	8.111 A	7.778 A	7.444 A
Lebanon (22-5-12) 6wk Interval	6.889 A	6.778 AB	6.556 BC	6.778 BC	6.444 CD	7.111 A
Lebanon (22-5-12) 12wk Interval	5.889 BC	5.778 CD	5.222 D	5.556 D	5.778 D	5.778 B
Agrium Type I (43-0-0)	6.667 AB	7.000 AB	6.667 BC	7.333 B	7.333 AB	7.222 A
Agrium Type II (43-0-0)	6.778 A	6.556 BC	6.889 B	7.333 B	7.222 AB	7.222 A
LSD value	0.8752	0.8770	0.6561	0.6111	0.7357	0.4969

Values followed by the same letter are not significantly different at $p=0.05$

Those fertilizers that consistently produced high clipping yields were urea and Agrium Type II (Table 3). The fertilizer that most often produced clipping yields that was greater than the untreated control was urea. In addition, the weekly clipping yields were totaled and a percent increase in yield was determined for the whole year (data not shown). Lebanon 22-5-12 (twelve week interval) showed only a 39% increase in clipping yield over the unfertilized plots. Lebanon 22-5-12 (six week interval) produced a 125% increase, Agrium Type II produced a 129% increase, Agrium Type I produced a 131% increase, and urea produced a 302% increase over the unfertilized plots.

Table 3 – Clipping yields for various fertilizers.

	28-Jun	6-Jul	12-Jul	18-Jul	25-Jul	1-Aug
CONTROL	14.82 C	17.08 A	8.930 D	18.20 C	18.94 C	16.07 C
Urea (46-0-0)	26.84 AB	28.89 A	33.81 A	56.13 A	54.19 A	43.97 A
Lebanon (22-5-12) 6wk Interval	18.90 BC	23.07 A	18.95 BC	30.97 BC	33.30 BC	27.37 ABC
Lebanon (22-5-12) 12wk Interval	15.84 C	17.77 A	14.04 CD	22.40 BC	23.96 BC	22.80 BC
Agrium Type I (43-0-0)	12.83 C	17.15 A	16.77 BC	29.63 BC	31.43 BC	32.20 ABC
Agrium Type II (43-0-0)	16.36 C	17.12 A	17.43 BC	27.17 BC	32.56 BC	43.73 A
LSD value	10.27	14.00	7.043	13.96	17.70	16.78

Values followed by the same letter are not significantly different at p=0.05

	8-Aug	15-Aug	22-Aug	31-Aug	7-Sep	13-Sep
CONTROL	14.80 C	7.66 D	7.93 C	2.97 D	4.707 C	3.267 C
Urea (46-0-0)	89.00 A	56.53 A	65.95 A	25.79 A	44.02 A	19.69 A
Lebanon (22-5-12) 6wk Interval	59.20 AB	20.47 BCD	30.45 B	11.05 BC	21.69 B	9.337 BC
Lebanon (22-5-12) 12wk Interval	32.83 BC	10.13 CD	12.66 C	4.55 CD	7.113 C	3.680 C
Agrium Type I (43-0-0)	36.60 BC	32.83 B	42.64 B	12.54 B	37.31 A	10.68 BC
Agrium Type II (43-0-0)	44.83 BC	19.90 BCD	31.39 B	12.49 B	31.89 AB	14.88 AB
LSD value	30.18	17.12	17.040	6.55	13.37	7.688

Values followed by the same letter are not significantly different at p=0.05

Discussion

The Agrium Type I and Type II fertilizers performed similarly in this trial. It may simply take a longer study period to adequately evaluate whether there are significant differences between these two products.

The Lebanon 22-5-12 (six week interval) performed similarly to the twelve week interval application for the first six weeks. There was a significant drop off in the second six week period which would indicate that application interval of six weeks is better than the twelve week interval.

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