

The Evaluation of Various Controlled Release Fertilizers for Use on Turf

M.K. Anderson and J.B. Ross
Prairie Turfgrass Research Centre
Olds College

Summary

The objective of this trial was to evaluate various fertilizers for their effect on the growth and consistency of growth on Kentucky bluegrass/fescue turf. Those fertilizers that had the best colour ratings were Grigg Bros Green Spec, CCF coated urea (low rate), PC Twice-a-year old and new formulation (high rate), and the CCF coated urea (high rate). The CCF coated urea and the Grigg Bros Green Spec was equal to the high rates of PC Twice-a-year, regardless as to whether it was a low or high rate of application. Those fertilizers that had the best overall quality ratings were PC Twice-a-year old and new formulation (high rate), CCF coated urea (low and high rates), and Grigg Bros Green Spec. The high rate of the PC Twice-a-year old was better than the low rate, however, for the CCF coated urea, there was no difference. Those fertilizers that consistently had the highest clipping yields were the high rates of the PC Twice-a-year (old and new formulation) and the CCF coated urea. Clipping yields were significantly higher on four occasions for the PC Twice-a-year old formulation at the high rate when compared to the low rate. The standard deviation is a measure of the consistency of nitrogen release, and as would be expected, the clipping yield fluctuated the least for the untreated control. Of the fertilizers the new formulation of PC Twice-a-year had the most consistent nitrogen release of any of the fertilizers and was considerably better than the old formulation.

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 differently here than in other areas of North America.

Fertilizers are formulated in order to produce consistently high growth characteristics. Colour and quality are indicators of the playability of the turf for various athletic events, while clipping yields are an indication of actual growth. A desirable fertilizer would produce excellent colour and quality while providing consistent clipping yields. Nitrogen sources are formulated so that they will provide a consistent release pattern thus minimizing growth fluctuations.

This trial was initiated in order to evaluate various fertilizers for their effects on growth within a cool climate of Canadian Prairie Provinces.

Methodology

Plots were laid out on a Kentucky bluegrass/fescue area at the Prairie Turfgrass Research Centre located at Olds College, Olds, Alberta, Canada. Plot sizes were 1 by 3 metres and laid out in a Randomized Complete Block Design. Individual treatments were replicated four times and were compared against an unfertilized control (Table 1). Applications of the fertilizers were made on either a four or eight week interval. Application rates were 0.5kg for the four week interval and 1.0 kg N/100 m² for the eight week interval. All fertilizers were applied on July 10 and a second application of the lower rate fertilizer was applied on August 8, 2006. Applications of the granular fertilizers were made using a Gandy drop spreader, which was calibrated for each fertilizer to apply the appropriate amount.

Table 1- Treatment schedule for fertilizer trial, 2006.

Product Name	Nutrient analysis	Application Rate	Application Interval
Unfertilized control	N/A		
Grigg Bros. Green Spec	16-4-8	0.5 Kg N/100m ²	Four weeks
PC Twice-a-Year (old formulation)	24-6-12	0.5 Kg N/100m ²	Four weeks
PC Twice-a-Year (new formulation)	24-6-12	0.5 Kg N/100m ²	Four weeks
CCF Coated Urea	22-8-10	0.5 Kg N/100m ²	Four weeks
PC Twice-a-Year (old formulation)	24-6-12	1.0 Kg N/100m ²	Eight weeks
PC Twice-a-Year (new formulation)	24-6-12	1.0 Kg N/100m ²	Eight weeks
CCF Coated Urea	22-8-10	1.0 Kg N/100m ²	Eight weeks

Colour and quality, as well as clipping yields, were rated weekly. The National Turfgrass Evaluation Program system of rating was used for colour and quality. In this study, 1 indicated a brown dormant turf and 9 indicated a dark green turf colouration. Density and area cover 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 and/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.

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

Results of weekly colour and quality ratings were combined into a single mean value for the trial (Table 2). Clipping yields values were recorded as grams per square meter per week. In order to determine the consistency of release of the various fertilizers the mean standard deviation was determined. This single value for each of the fertilizers is a measurement in grams of the deviation from the average (mean) clipping yields. The lower the number the more consistently the nitrogen in the fertilizer is released.

Results

Weather

The summer of 2006 was generally warm and dry. July had below average precipitation and above average temperatures. August had above normal temperatures with a significant rainfall of 42 mm between August 9 and 11.

Colour Ratings

Those fertilizers that had the best colour ratings were Grigg Bros Green Spec, CCF coated urea (low rate), PC Twice-a-year old and new formulation (high rate), and the CCF coated urea (high rate) (Table 2). Colour ratings produced by the high rate of PC Twice-a-year were significantly better than the lower rate. The CCF coated urea and the Grigg Bros Green Spec was equal to the high rates of PC Twice-a-year, regardless as to whether it was a low or high rate of application. All fertilizers were better than the untreated control.

Table 2 - Kentucky bluegrass fertilizer trial 2006.

Product	Colour	Turf Quality	Clipping Dry Weights per Week								Standard Deviation
			Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	
— 1-9 scale —		g/m ²									
Every 4 weeks											
Untreated	6.0c	6.0c	7.2c	8.1d	6.6d	7.3c	6.2d	9.8b	5.2b	6.1c	1.4
Grigg Bros	6.9a	6.3ab	14.4abc	18.8bc	16.3abc	16.1ab	12.3abc	16.2a	9.2ab	9.1abc	3.5
PC (old)	6.6b	6.2b	13.0bc	14.0cd	13.1c	13.0b	10.1cd	14.4ab	7.5ab	8.5abc	2.6
PC (new)	6.6b	6.2b	12.5bc	15.5cd	15.9bc	15.5ab	11.7abc	16.6a	11.0a	11.9a	2.3
CCF	6.8ab	6.3ab	16.8ab	18.7bc	16.2bc	15.1ab	10.8bc	16.6a	11.2a	10.4ab	3.2
Every 8 weeks											
PC (old)	7.0a	6.4a	18.3ab	27.4a	22.4a	20.4a	14.3ab	16.1a	7.6ab	8.3bc	6.8
PC (new)	6.9a	6.3ab	15.3ab	20.4abc	20.5ab	20.4a	15.8a	17.3a	11.6a	11.3ab	3.5
CCF	6.8ab	6.3ab	21.0a	24.9ab	21.6ab	18.7a	12.3abc	14.3ab	7.7ab	7.9bc	6.5
LSD _{0.05} =	0.2	0.1	7.5	8.2	6.1	5.3	4.2	4.7	5.4	3.5	

Quality Ratings

Those fertilizers that had the best overall quality ratings were PC Twice-a-year old and new formulation (high rate), CCF coated urea (low and high rates), and Grigg Bros Green Spec. The high rate of the PC Twice-a-year old was better than the low rate, however, for the CCF coated urea, there was no difference. All fertilizers were better than the untreated control.

Consistently High Clipping Yields

Those fertilizers that consistently had the highest clipping yields were the high rates of the PC Twice-a-year (old and new formulation) and the CCF coated urea. Clipping yields were significantly higher on four occasions for the PC Twice-a-year old formulation at the high rate when compared to the low rate. There were no significant differences between the high and low rate for the new formulation of PC Twice-a-year. Generally, all fertilizers produced higher clipping yields than did the untreated control, but they were not always significant.

Consistency of Nitrogen Release

The standard deviation is a measure of the consistency of nitrogen release. As would be expected the clipping yield fluctuated the least for the untreated control. Of the fertilizers the new formulation of PC Twice-a-year had the most consistent nitrogen release of any of the fertilizers. At the low rate the Grigg Bros Green Spec and the CCF were much less consistent, while at the high rate it was much more consistent than either the old formulation or the CCF product.

Financial support for this trial was received from the Gardenworth Corporation and Grigg Brothers Fertilizers.