

# Evaluation of Controlled Release Nitrogen Fertilizers on Creeping Bentgrass

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## Summary

The objective of this trial was to evaluate various fertilizers for their effect on a USGA specification sand based creeping bentgrass putting green. Colour ratings provide an evaluation of nitrogen release when compared with an untreated control. In addition, colour ratings provided an evaluation of how consistently the fertilizer releases its nitrogen when compared with the untreated control (Table 2). Those fertilizers that consistently were the best were Grigg Bros Green Spec 7 Iron 7-7-7 granular and Grigg Bros Green Spec 16-4-8. The following fertilizers were equal to the best on nine of eleven rating dates: Nu-Gro 6Iron Liquid 15-0-0, Turf Bred St.Andrews Huma plus 8-3-5, Premium Green Gro Power 10-2-5 and Plant Food 50% SRN Liquid 12-3-12.

Quality ratings were also determined on a weekly basis. The fertilizers that consistently were the best or equal to the best were Grigg Bros Green Spec 7 Iron 7-7-7 granular, Grigg Bros Green Spec 16-4-8 and Nu-Gro 6Iron Liquid 15-0-0. The next most consistent fertilizers were: Turf Bred St.Andrews Huma plus 8-3-5, Premium Green Gro Power 10-2-5 and Grigg Bros Green Spec 10-2-4.

Clipping yields were also collected on a weekly basis. The fertilizer that consistently was the best was Grigg Bros Green Spec 7 Iron 7-7-7 granular. Other fertilizers that were equal to the best on most rating dates were Grigg Bros Green Spec 16-4-8, Nu-Gro 6Iron Liquid 15-0-0 and Turf Bred St. Andrews Huma plus 8-3-5.

## 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 from other areas of North America. This trial was initiated in order to evaluate various fertilizers for their effects on growth within the cool climate of Alberta.

## Materials and Methods

Plots were laid out on a USGA specification sand based Penncross creeping bentgrass green at the Prairie Turfgrass Research Centre, Olds College, Olds, Alberta, Canada. Plots, which were 1.5 by 2 metres in size, were replicated four times and laid out in a Randomized Complete Block Design.

Treatment applications were made every two weeks beginning June 22, 2006 at a rate of 0.2 kg N/100m<sup>2</sup>. Applications of the granular fertilizers were made using a Gandy drop spreader, which was calibrated for each fertilizer to apply the appropriate amount. The liquid products were applied with a compressed air plots sprayer. The sprayer was equipped with TeeJet 8004 nozzles which were calibrated to apply 5.7 litres/100m<sup>2</sup>.

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, where 1 is poor and 9 is

superior. Colour was rated by 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, which is a subjective rating of shoots per unit of area, was rated as 1 is poor density and 9 is superior density. The area cover rating is described as the area covered by desired turfgrass and is rated by 1 indicates a complete lack of cover and 9 equals complete 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.

Results were evaluated based on those fertilizers that consistently performed the best. 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.

In addition, the data that shows superior colour, quality and clipping yield was evaluated by determining how many weeks the particular fertilizer was either the best or equal to the best fertilizer. This is indicated by the frequency of superior ranking or superior clipping yield.

Treatments:

1. Untreated control

Granular Fertilizers:

2. Turf Bred St.Andrews Huma plus 8-3-5
3. Turf Bred St.Andrews Huma plus 5-4-5
4. Premium Green Gro power 10-2-5
5. Grigg Bros Green Spec 7 Iron 7-7-7
6. Grigg Bros Green Spec 16-4-8
7. Grigg Bros Green Spec 10-2-4

Liquid Fertilizers:

8. Nu-Gro 6Iron Liquid 15-0-0
9. Nu-Gro 50% SRN Liquid 26-2-3
10. Plant Food 50% SRN Liquid 12-3-12
11. Plant Food Program
  - a. Green T 12-3-12
  - b. Green T N-28% SRN 28-0-0
  - c. Adams Earth organic soil amendment
  - d. Green T micro mix 1-0-0
  - e. Green t Sugar cal 1-0-0 10%calcium
  - f. Phosphite 40 2-40-16
  - g. Potassium + (Sept12th) 0-0-25

## **Results**

The summer of 2006 was not considered typical for the Canadian Prairie Provinces. June had above average precipitation with near normal temperatures. July and August were much below for precipitation and much above for temperatures. September had normal temperatures and near normal precipitation.

Colour ratings were determined in order to evaluate initial green-up following application of the fertilizers. In addition, colour ratings provided an evaluation of how consistently the fertilizer released its nitrogen when compared with the untreated control (Tables 1a and 1b). Those fertilizers that consistently were the best were Grigg Bros Green Spec 7 Iron 7-7-7 granular and Grigg Bros Green Spec 16-4-8. The following fertilizers were equal to the best on nine of eleven rating dates: Nu-Gro 6Iron Liquid 15-0-0, Turf Bred St. Andrews Huma Plus 8-3-5 Premium Green Gro Power 10-2-5 and Plant Food 50% SRN Liquid 12-3-12.

Quality ratings were also determined on a weekly basis. The fertilizers that consistently were the best or equal to the best were Grigg Bros Green Spec 7 Iron 7-7-7 granular, Grigg Bros Green Spec 16-4-8 and Nu-Gro 6Iron Liquid 15-0-0 (Tables 2a and 2b). The next most consistent fertilizers were: Turf Bred St. Andrews Huma plus 8-3-5, Premium Green Gro power 10-2-5 and Grigg Bros Green Spec 10-2-4.

Clipping yields were also collected on a weekly basis. The fertilizer that consistently was the best was Grigg Bros Green Spec 7 Iron 7-7-7 granular (Tables 3a and 3b). Other fertilizers that were equal to the best on most rating dates were Grigg Bros Green Spec 16-4-8, Nu-Gro 6Iron Liquid 15-0-0 and Turf Bred St. Andrews Huma plus 8-3-5.

## **Discussion**

The best of the St. Andrews products was the Huma Plus granular fertilizer 8-3-5 and it consistently ranked with the best products overall. The Plant Food 50% SRN liquid fertilizer was in the middle of the overall group for all three rating criteria. On one occasion it caused discolouration of the turf with a blackened appearance. Generally, liquid fertilizers are not as consistent in their release and the insoluble portion of the product may have contributed to this observation. The Plant Food program which included a number of different fertilizers on different dates did no better than the other fertilizers and it would appear that there was no benefit to the different applications.

The Grigg Brothers products were some of the best performers in this year's trial. The Green Spec 7 Iron 7-7-7 and the Green Spec 16-4-8 were consistently the top rated products.

The Premium Gro Power generally produced a good response and was close in performance to the top rated products.

The Nu-Gro 6 Iron liquid fertilizer on one occasion discoloured the turf with a blackened appearance. However, it generally produced good colour, quality and high clipping yields. The Nu-Gro 50% SRN liquid was very similar to the Plant Food 50% SRN product.

Table 1a. Turf colour for various fertilizer treatments, 2006

Treatment	June 27 <sup>th</sup>	July 4 <sup>th</sup>	July 11 <sup>th</sup>	July 18 <sup>th</sup>	July 25 <sup>th</sup>	August 1 <sup>st</sup>
	————— 1-9 scale —————					
Untreated control No fertilizer applied	5.8a <sup>†</sup>	6.0a	6.0a	5.0d	6.8a	6.0a
St.Andrews Huma Plus Granular fertilizer 8-3-5	6.0a	6.0a	6.8a	6.8ab	7.5a	6.5a
St.Andrews Huma Plus Granular fertilizer 5-4-5	6.0a	6.0a	6.3a	6.3bc	7.3a	5.8a
Premium Green Gro Power Granular fertilizer 10-2-5	6.0a	6.0a	6.8a	6.8ab	7.3a	6.3a
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	6.0a	6.0a	7.3a	7.0a	7.5a	6.5a
Grigg Bros Green Spec Granular fertilizer 16-4-8	6.0a	6.0a	7.0a	7.0a	7.5a	6.8a
Grigg Bros Green Spec Granular fertilizer 10-2-4	6.0a	6.0a	6.5a	6.0c	7.3a	6.5a
Nu-Gro 6Iron Liquid fertilizer 15-0-0	6.0a	6.0a	7.3a	7.0a	7.8a	6.5a
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	6.0a	6.0a	6.5a	6.8ab	7.0a	6.0a
Plant Food 50% SRN Liquid fertilizer 12-3-12	6.0a	6.0a	6.8a	6.8ab	7.5a	6.5a
Plant Food Feeding Program Liquid fertilizer + additives	6.0a	6.0a	6.3a	6.3bc	7.3a	6.3a
LSD <sub>0.10</sub> =	n/s	n/s	n/s	0.7	n/s	n/s

<sup>†</sup>Within columns, means followed by the same letter are not significantly different at the 0.05 probability level

Table 1b. Turf Colour for various fertilizer treatments, 2006

Treatment	August 8 <sup>th</sup>	August 15 <sup>th</sup>	August 22 <sup>th</sup>	August 29 <sup>th</sup>	Sept 5 <sup>th</sup>	Frequency of superior turf quality
Untreated control No fertilizer applied	5.3c †	5.0b	5.0d	5.8d	5.5e	5 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 8-3-5	6.0ab	6.0a	6.0bc	6.3bcd	7.3ab	9 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 5-4-5	6.0ab	5.8a	6.3bc	6.3bcd	6.3cde	7 out of 11 ratings
Premium Green Gro Power Granular fertilizer 10-2-5	6.0ab	5.8a	6.3bc	6.5abc	6.0cde	9 out of 11 ratings
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	6.3a	6.0a	7.0a	6.8ab	6.8abc	11 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 16-4-8	6.3a	6.0a	6.5ab	6.5abc	6.8abc	11 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 10-2-4	6.0ab	6.0a	6.3bc	6.8ab	6.5bcd	8 out of 11 ratings
Nu-Gro 6Iron Liquid fertilizer 15-0-0	6.0ab	5.8a	6.3bc	6.3bcd	7.5a	9 out of 11 ratings
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	5.5bc	5.5ab	6.3bc	7.0a	6.3cde	8 out of 11 ratings
Plant Food 50% SRN Liquid fertilizer 12-3-12	6.0ab	5.5ab	6.3bc	6.5abc	6.5bcd	9 out of 11 ratings
Plant Food Feeding Program Liquid fertilizer + additives	5.5bc	5.0b	5.8c	6.0cd	5.8de	5 out of 11 ratings
LSD <sub>0.10</sub> =	0.5	0.5	0.7	0.6	0.9	

† Within columns, means followed by the same letter are not significantly different at the 0.05 probability level

Table 2a. Overall turf quality for various fertilizer treatments, 2006

Treatment	June 27 <sup>th</sup>	July 4 <sup>th</sup>	July 11 <sup>th</sup>	July 18 <sup>th</sup>	July 25 <sup>th</sup>	August 1 <sup>st</sup>	
	————— 1-9 scale —————						
Untreated control No fertilizer applied	5.7a <sup>†</sup>	5.8a	6.0c	5.5c	5.7b	5.6c	
St.Andrews Huma Plus Granular fertilizer 8-3-5	5.8a	5.8a	6.2abc	6.3ab	6.8a	6.1ab	
St.Andrews Huma Plus Granular fertilizer 5-4-5	6.0a	6.0a	6.1bc	6.1b	6.7a	5.8c	
Premium Green Gro Power Granular fertilizer 10-2-5	5.9a	5.8a	6.2abc	6.3ab	6.7a	6.2ab	
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	6.0a	5.8a	6.4a	6.6a	6.8a	6.1abc	
Grigg Bros Green Spec Granular fertilizer 16-4-8	6.0a	5.8a	6.3ab	6.4ab	6.8a	6.3a	
Grigg Bros Green Spec Granular fertilizer 10-2-4	5.8a	5.9a	6.1bc	6.1b	6.8a	6.3a	
Nu-Gro 6Iron Liquid fertilizer 15-0-0	5.7a	5.9a	6.4a	6.4ab	6.7a	6.3a	
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	5.9a	5.9a	6.1bc	6.2b	6.7a	5.9bc	
Plant Food 50% SRN Liquid fertilizer 12-3-12	5.7a	5.8a	6.2abc	6.2b	6.8a	6.1abc	
Plant Food Feeding Program Liquid fertilizer + additives	5.8a	5.8a	6.1bc	6.1b	6.7a	6.1abc	
	LSD <sub>0.10</sub> =	n/s	n/s	0.2	0.3	0.4	0.3

<sup>†</sup>Within columns, means followed by the same letter are not significantly different at the 0.05 probability level

Table 2bb Overall turf quality for various fertilizer treatments, 2006

Treatment	August 8 <sup>th</sup>	August 15 <sup>th</sup>	August 22 <sup>th</sup>	August 29 <sup>th</sup>	Sept 5 <sup>th</sup>	Frequency of superior turf quality
	----- 1-9 scale -----					
Untreated control No fertilizer applied	5.3d†	5.3c	5.6d	5.8e	5.9e	2 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 8-3-5	5.7bc	5.8ab	6.0bcd	6.1cde	7.0a	8 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 5-4-5	5.6bcd	5.6ab	6.0bcd	6.2bcde	6.5abcd	5 out of 11 ratings
Premium Green Gro Power Granular fertilizer 10-2-5	5.7bc	5.6abc	6.1abc	6.1cde	6.3cde	8 out of 11 ratings
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	5.9ab	5.9a	6.5a	6.4bcd	6.9ab	10 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 16-4-8	6.1a	5.8ab	6.5a	6.4 bcd	6.6abcd	10 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 10-2-4	5.9ab	5.8ab	6.4ab	6.6ab	6.7abc	9 out of 11 ratings
Nu-Gro 6Iron Liquid fertilizer 15-0-0	5.8ab	5.8ab	6.2abc	6.1cde	6.9ab	10 out of 11 ratings
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	5.6bcd	5.7abc	6.2abc	7.0a	6.6abcd	7 out of 11 ratings
Plant Food 50% SRN Liquid fertilizer 12-3-12	5.6bcd	5.5bc	6.1abc	6.5bc	6.7abc	7 out of 11 ratings
Plant Food Feeding Program Liquid fertilizer + additives	5.4cd	5.6abc	5.9cd	6.0de	6.1de	5 out of 11 ratings
LSD <sub>0.10</sub> =	0.3	0.3	0.4	0.4	0.5	

†Within columns, means followed by the same letter are not significantly different at the 0.05 probability level

Table 3a. Clipping yield - grams of dry matter per m<sup>2</sup> for various fertilizer treatments, 2006

Treatment	June 27 <sup>th</sup>	July 4 <sup>th</sup>	July 11 <sup>th</sup>	July 18 <sup>th</sup>	July 25 <sup>th</sup>	August 1 <sup>st</sup>	
	g/m <sup>2</sup>						
Untreated control No fertilizer applied	12.6a†	16.2a	19.8a	13.9de	9.7c	8.1de	
St.Andrews Huma Plus Granular fertilizer 8-3-5	16.8a	16.8a	18.3a	23.9ab	19.4ab	13.8a	
St.Andrews Huma Plus Granular fertilizer 5-4-5	15.8a	15.8a	19.1a	19.9bcd	22.1ab	11.5abcde	
Premium Green Gro Power Granular fertilizer 10-2-5	15.1a	15.1a	16.4a	19.8bcd	21.4ab	11.7abcd	
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	18.8a	18.8a	18.9a	26.0a	23.7a	15.1a	
Grigg Bros Green Spec Granular fertilizer 16-4-8	16.1a	16.1a	17.1a	21.0abc	24.2a	14.7a	
Grigg Bros Green Spec Granular fertilizer 10-2-4	13.3a	13.3a	13.5a	15.9cde	16.5abc	12.5ab	
Nu-Gro 6Iron Liquid fertilizer 15-0-0	14.9a	14.9a	19.1a	20.4abc	23.4ab	12.0abc	
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	17.5a	17.5a	13.0a	16.8cde	22.8ab	8.9bcde	
Plant Food 50% SRN Liquid fertilizer 12-3-12	15.4a	15.4a	12.8a	13.9de	15.5bc	7.8e	
Plant Food Feeding Program Liquid fertilizer + additives	12.6a	12.6a	12.0a	12.3e	10.1c	9.2bcde	
	LSD <sub>0.05</sub> =	n/s	n/s	n/s	6.0	8.0	3.7

†Within columns, means followed by the same letter are not significantly different at the 0.05 probability level



Table 3b. Clipping yield - grams of dry matter per m<sup>2</sup> for various fertilizer treatments, 2006

Treatment	August 8 <sup>th</sup>	August 15 <sup>th</sup>	August 22 <sup>th</sup>	August 29 <sup>th</sup>	Sept 5 <sup>th</sup>	Frequency of superior clipping yield
	g/m <sup>2</sup>					
Untreated control No fertilizer applied	3.5d <sup>†</sup>	5.2d	29.1b	7.7a	3.9a	5 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 8-3-5	10.7a	10.5bc	33.3b	8.7a	4.6a	9 out of 11 ratings
St.Andrews Huma Plus Granular fertilizer 5-4-5	6.8bc	7.4cd	32.3b	6.7a	5.8a	7 out of 11 ratings
Premium Green Gro Power Granular fertilizer 10-2-5	6.6bcd	8.4bcd	32.6b	5.3a	4.7a	7 out of 11 ratings
Grigg Bros Green Spec 7 Iron Granular fertilizer 7-7-7	10.7a	14.4a	39.4a	10.6a	7.2a	11 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 16-4-8	10.1ab	11.1ab	33.0b	5.9a	6.7a	10 out of 11 ratings
Grigg Bros Green Spec Granular fertilizer 10-2-4	7.8abc	11.7ab	32.7b	5.2a	6.0a	9 out of 11 ratings
Nu-Gro 6Iron Liquid fertilizer 15-0-0	9.5ab	11.2ab	32.6b	8.2a	5.2a	10 out of 11 ratings
Nu-Gro 50% SRN Liquid Liquid fertilizer 26-2-3	5.8cd	7.3cd	32.6b	6.8a	4.8a	6 out of 11 ratings
Plant Food 50% SRN Liquid fertilizer 12-3-12	6.5cd	7.5cd	31.2b	4.8a	3.3a	5 out of 11 ratings
Plant Food Feeding Program Liquid fertilizer + additives	5.7cd	5.9d	28.7b	4.0a	3.9a	5 out of 11 ratings
LSD <sub>0.05</sub> =	3.5	3.3	5.0	n/s	n/s	

<sup>†</sup>Within columns, means followed by the same letter are not significantly different at the 0.05 probability level