

The Evaluation of Various Fertilizers for Use on Turf

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Summary

The Bioyield 16-4-5 was the top performing fertilizer in this trial. It consistently outperformed the other synthetic fertilizers, including the industry standard entry. As far as the organic fertilizers were concerned the blood meal 12-0-0 rated consistently high for colour, quality and clipping yield when compared to the other organics.

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 2 metres and laid out in a Randomized Complete Block Design. The performance of the various fertilizers was compared against an industry standard as well as an unfertilized control. The industry standard fertilizer, Scotts Turf Builder 31-3-8, is one that is readily available to the homeowner market and has provided good performance in previous trials.

Rate of application of the fertilizers was 0.5 kg N/100m². The initial application of fertilizer was applied on June 4 and then subsequent applications were made at six week intervals. Application of the granular fertilizers was made using a Scott's drop spreader, which was calibrated to apply the appropriate amount of fertilizer. Colour and quality, as well as clipping yields, were rated weekly.

The trial consisted of both organic and synthetic fertilizers. Those fertilizers that were considered to be organic, i.e. their nitrogen was 100% from naturally occurring sources, were Bioyield 5-4-2, canola meal 6-2-1, Amaizeingly Green 10-0-0, Gaia Green 6-2-3, blood meal 12-0-0, and blood and bone meal 9-6-0. One other fertilizer Bioyield 16-4-5 was reported to have an organic component to it, while Andersons Nutri DG 24-0-10 and Scott's Turf Builder 31-3-8 were 100% synthetic.

Table 1 – Treatment list for Kentucky bluegrass fertility trial, 2009.

Product	Product components
Untreated Check	N/A
Bioyield 5-4-2	Proprietary blend
Bioyield 16-4-5	Proprietary blend
Andersons Nutri DG 24-0-10	Synthetic fertilizer Dispersible Granular Derived from methylene urea
Canola meal 6-2-1	100% organic Meal left after oil extraction from canola seed
Amaizeingly Green 10-0-0	100% organic Meal left after processing of corn
Gaia Green 6-2-3	Proprietary blend
Blood meal 12-0-0	100% organic Dried animal blood meal
Blood & bone meal 9-6-0	100% organic Dried animal blood and bone meal

Scotts Turf builder 31-3-8

Synthetic fertilizer
Derived from methylene urea

For colour ratings, 1 indicated a brown dormant turf and 9 indicated a dark green turf. The individual treatments were assessed for consistently superior colour over the 17 week period, i.e. a treatment was considered superior when it had an 'a' ranking. They were also rated for consistently good colour ratings, which meant that products had either an 'a' or 'b' ranking. Mean standard deviation was considered to be a measure of consistent colour i.e. the higher the value (measured in percent), the greater the variation from the mean (average) value when 17 weeks of data was combined.

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. Mean standard deviation for quality was a measure of consistent quality, i.e. the higher the percent, the greater the variation from the mean value when 17 weeks of data was combined.

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 yield values 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. The lower the number, the more consistent was the release of nitrogen in the fertilizer.

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

As far as initial green-up was concerned, the two synthetics Bioyield 16-4-5 and Scott's Turf Builder 31-3-8 were the best. As far as superior colour was concerned, Bioyield 16-4-5 was top rated on each occasion. Good colour was obtained from Scott's Turf Builder 31-3-8, Anderson Nutri DG 24-0-10, and blood meal 12-0-0.

When comparing the organic fertilizers, blood meal, blood and bone meal, Gaia Green and Amaizeingly Green had good colour.

Table 2 – Turfgrass colour for Kentucky bluegrass fertilizer trial, 2009.

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
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————— 1 - 9 scale —————

Untreated Check		6.0a	6.0cd	6.0cd	5.5f	5.0f	5.0f
Bioyield	5-4-2	6.0a	6.0cd	6.0cd	6.0def	5.2ef	6.0de
Bioyield	16-4-5	6.0a	7.5a	7.5a	8.0a	7.2a	8.0a
Andersons Nutri DG	24-0-10	6.0a	7.0b	6.0cd	6.5bcd	6.0bcd	6.5c
Canola meal	6-2-1	6.0a	6.2c	6.2c	6.0def	5.5def	6.0de
Amaizeingly Green	10-0-0	6.0a	6.0cd	6.0cd	6.5bcd	6.2bc	7.0b
Gaia Green	6-2-3	6.0a	5.7d	6.0cd	6.2cde	5.7cde	6.2cd
Blood meal	12-0-0	6.0a	6.0cd	6.0cd	6.7bc	5.7cde	6.5c
Blood & bone meal	9-6-0	6.0a	5.7d	5.7d	6.0def	6.0bcd	6.0de
Scotts Turf builder	31-3-8	6.0a	7.0b	7.0b	7.0b	6.5b	7.0b
LSD _{0.05} =		n/s	0.4	0.3	0.5	0.6	0.4

		Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
		1 - 9 scale					
Untreated Check		5.2e	5.0e	5.5d	5.2e	5.0e	5.0f
Bioyield	5-4-2	5.5de	6.0cd	6.5bc	6.5cd	6.5cd	7.0bc
Bioyield	16-4-5	7.0a	8.0a	7.7a	8.0a	8.0a	8.0a
Andersons Nutri DG	24-0-10	6.5ab	7.0b	6.5bc	6.7bc	7.2bc	7.2b
Canola meal	6-2-1	6.0bcd	6.0cd	6.5bc	6.5cd	6.5cd	7.0bc
Amaizeingly Green	10-0-0	6.2bc	5.7de	6.5bc	6.7bc	6.5cd	6.5cde
Gaia Green	6-2-3	6.0bcd	6.2cd	6.5bc	6.7bc	6.7bc	6.7bcd
Blood meal	12-0-0	6.2bc	6.5bc	6.5bc	7.0bc	7.0b	7.0bcd
Blood & bone meal	9-6-0	6.5ab	6.7bc	7.0abc	7.2b	6.7bc	6.7bcd
Scotts Turf builder	31-3-8	7.0a	6.7bc	7.2ab	7.0bc	7.0b	7.2b
LSD _{0.05} =		0.6	0.7	0.8	0.5	0.4	0.5

		Week 13	Week 14	Week 15	Week 16	Week 17
		1 - 9 scale				
Untreated Check		5.5e	5.5d	5.2d	5.2e	5.0f
Bioyield	5-4-2	6.5bcd	6.2c	6.5bc	6.5cd	6.5cde
Bioyield	16-4-5	8.0a	8.0a	8.0a	8.0a	8.0a
Andersons Nutri DG	24-0-10	7.0b	7.7a	7.0b	7.7ab	7.0bc
Canola meal	6-2-1	6.7bc	6.7bc	7.0b	7.0bc	7.0bc
Amaizeingly Green	10-0-0	6.7bc	6.5bc	6.7bc	6.7cd	6.2de
Gaia Green	6-2-3	7.0b	7.0b	6.7bc	7.0bc	6.7cd
Blood meal	12-0-0	6.7bc	7.0b	7.0b	7.2bc	7.0bc
Blood & bone meal	9-6-0	6.7bc	7.0b	6.7bc	6.7cd	6.5cde
Scotts Turf builder	31-3-8	7.0b	7.7a	7.0b	7.7ab	7.7ab
LSD _{0.05} =		0.5	0.6	0.5	0.7	0.6

* Values that have the same letter as a suffix are not significantly different from each other.

Table 3 – Superior and good rating and standard deviation for turfgrass colour, 2009.

		Superior Turf Colour Rating	Good Turf Colour Rating	Standard Deviation
		# weeks	# weeks	1 – 9 scale
Untreated Check		1 out of 17	1 out of 17	47%
Bioyield	5-4-2	1 out of 17	3 out of 17	56%
Bioyield	16-4-5	17 out of 17	17 out of 17	58%

Andersons Nutri DG	24-0-10	4 out of 17	15 out of 17	63%
Canola meal	6-2-1	1 out of 17	9 out of 17	59%
Amaizeingly Green	10-0-0	1 out of 17	10 out of 17	47%
Gaia Green	6-2-3	1 out of 17	10 out of 17	56%
Blood meal	12-0-0	1 out of 17	13 out of 17	57%
Blood & bone meal	9-6-0	3 out of 17	11 out of 17	61%
Scotts Turf builder	31-3-8	6 out of 17	17 out of 17	49%

Bioyield 16-4-5 showed the best overall quality and was top ranked on each rating date. Good quality was obtained with Scott's Turf Builder 31-3-8, Andersons Nutri DG 24-0-10, blood meal, and Gaia Green.

Table 4 – Turfgrass quality ratings for Kentucky bluegrass fertilizer trial, 2009.

		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
		1 - 9 scale					
Untreated Check		6.7a	6.3c	6.9bcd	7.1ab	6.5d	6.3e
Bioyield	5-4-2	6.7a	6.5bc	6.8cd	6.8bc	6.9abc	6.8cd
Bioyield	16-4-5	6.8a	7.1a	7.5a	7.4a	7.1ab	7.7a
Andersons Nutri DG	24-0-10	6.6a	6.9ab	7.3ab	7.3a	6.9abc	7.0bc
Canola meal	6-2-1	6.7a	6.9ab	7.1abcd	7.3a	7.1ab	6.7d
Amaizeingly Green	10-0-0	6.8a	6.8abc	7.1abcd	7.1ab	6.9abc	7.0bc
Gaia Green	6-2-3	6.8a	6.6abc	7.1abcd	7.2ab	6.8bcd	6.7d
Blood meal	12-0-0	6.8a	6.8abc	7.0bcd	7.3a	7.0abc	7.0bc
Blood & bone meal	9-6-0	6.8a	6.9ab	7.2abc	7.3a	7.0abc	6.7d
Scotts Turf builder	31-3-8	6.7a	6.7abc	6.9bcd	7.3a	7.2a	7.1b
LSD _{0.05} =		n/s	0.5	0.4	0.4	0.3	0.2
		1 - 9 scale					
		Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Untreated Check		6.4d	5.9f	6.5c	6.2e	6.2e	6.4g
Bioyield	5-4-2	6.5cd	6.6cde	6.8bc	6.9cd	7.0bcd	7.1cde
Bioyield	16-4-5	7.3a	7.6a	7.4a	7.8a	7.8a	8.0a
Andersons Nutri DG	24-0-10	6.8b	7.1b	7.0ab	7.1bc	7.2bc	7.3bc
Canola meal	6-2-1	6.7bc	6.6cde	7.1ab	7.0cd	7.1bc	7.1cde
Amaizeingly Green	10-0-0	6.8b	6.6cde	6.8bc	7.0cd	6.9cd	7.0def
Gaia Green	6-2-3	6.7bc	6.7bcde	6.9bc	7.0cd	7.0bcd	7.0def
Blood meal	12-0-0	6.7bc	6.8bcd	6.8bc	7.2bc	7.3b	7.2cd
Blood & bone meal	9-6-0	6.7bc	6.6cde	6.9bc	6.9cd	7.1bc	7.2cd
Scotts Turf builder	31-3-8	7.1a	7.0bc	7.1ab	7.4b	7.2bc	7.5b
LSD _{0.05} =		0.2	0.4	0.4	0.3	0.3	0.2
		1 - 9 scale					
		Week 13	Week 14	Week 15	Week 16	Week 17	
Untreated Check		6.5f	6.4e	6.6f	6.0g	6.0g	
Bioyield	5-4-2	6.9cde	6.9d	7.1de	7.0def	6.8def	
Bioyield	16-4-5	7.8a	8.0a	8.0a	7.8a	7.9a	

Andersons Nutri DG	24-0-10	7.3b	7.5b	7.5bc	7.4bc	7.2bc
Canola meal	6-2-1	7.1bcd	7.1cd	7.3cde	7.1cde	7.0cde
Amaizeingly Green	10-0-0	7.1bcd	7.0d	7.4bcd	7.1cde	6.7ef
Gaia Green	6-2-3	7.2bc	7.2bcd	7.4bcd	7.2bcd	6.9cdef
Blood meal	12-0-0	7.0bcde	7.4bc	7.7ab	7.2bcd	7.1cd
Blood & bone meal	9-6-0	7.1bcd	7.0d	7.2cde	7.1cde	6.9cdef
Scotts Turf builder	31-3-8	7.3b	7.5b	7.4bcd	7.5b	7.5b
LSD _{0.05} =		0.3	0.3	0.3	0.3	0.3

* Values that have the same letter as a suffix are not significantly different from each other.

Table 5 – Superior rating and standard deviation for turfgrass quality, 2009.

		Superior Turf Quality Score	Good Turf Quality Score	Standard Deviation
		# weeks	# weeks	1 – 9 scale
Untreated Check		2 out of 17	3 out of 17	54%
Bioyield	5-4-2	2 out of 17	6 out of 17	43%
Bioyield	16-4-5	17 out of 17	17 out of 17	55%
Andersons Nutri DG	24-0-10	6 out of 17	17 out of 17	49%
Canola meal	6-2-1	6 out of 17	9 out of 17	53%
Amaizeingly Green	10-0-0	5 out of 17	10 out of 17	56%
Gaia Green	6-2-3	4 out of 17	13 out of 17	46%
Blood meal	12-0-0	5 out of 17	15 out of 17	60%
Blood & bone meal	9-6-0	5 out of 17	9 out of 17	49%
Scotts Turf builder	31-3-8	6 out of 17	17 out of 17	53%

The highest initial growth as measured by clipping yield was achieved by Bioyield 16-4-5, Scott's Turf Builder 31-3-8, and Andersons Nutri DG 24-0-10. The highest clipping yield fertilizer, by quite a wide margin, was Bioyield 16-4-5. The Scott's Turf Builder 31-3-8 and Andersons Nutri DG 24-0-10 consistently produced good clipping yields.

As far as the organics were concerned, the highest yielding fertilizers were blood meal, canola meal, Gaia Green, Amaizeingly Green and Bioyield 5-4-2.

Table 4 – Clipping yield for Kentucky bluegrass fertilizer trial, 2009.

		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
		g/m ²					
Untreated Check		5.7a	7.0e	7.7g	5.5de	2.5e	3.0bc
Bioyield	5-4-2	6.2a	9.5cde	13.5d	6.5cde	3.2cde	3.0bc
Bioyield	16-4-5	7.7a	19.7a	29.5a	19.2a	16.7a	8.5a
Andersons Nutri DG	24-0-10	7.2a	16.0ab	19.5b	9.2bc	6.0bc	4.0b
Canola meal	6-2-1	5.2a	12.5bcd	14.0cd	8.5bcd	4.7bcde	3.5b
Amaizeingly Green	10-0-0	6.0a	9.0cde	12.2def	8.2bcd	6.2b	4.0b
Gaia Green	6-2-3	8.5a	13.5bc	13.2de	7.7bcde	3.7bcde	3.0bc
Blood meal	12-0-0	8.5a	13.0bc	14.2cd	8.2bcd	4.7bcde	3.5b
Blood & bone meal	9-6-0	6.2a	5.7e	7.0g	4.7e	3.0de	3.0bc
Scotts Turf builder	31-3-8	7.2a	14.7b	17.7bc	10.2b	6.0bc	4.0b
LSD _{0.05} =		n/s	4.6	3.9	3.3	2.9	1.2

		Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
		g/m ²					
Untreated Check		5.0b	4.5c	5.0bcd	3.5cd	4.2bc	4.0cd
Bioyield	5-4-2	3.0de	3.0c	4.7cd	3.5cd	3.0cd	4.0cd
Bioyield	16-4-5	10.2a	16.0a	10.5a	13.2a	15.0a	6.2a
Andersons Nutri DG	24-0-10	2.0e	3.0c	3.5d	4.7bc	5.0b	5.0b
Canola meal	6-2-1	4.0bcd	4.0c	5.0bcd	3.2cd	3.2cd	3.7de
Amaizeingly Green	10-0-0	3.5cd	3.5c	3.7d	3.0d	3.2cd	3.2e
Gaia Green	6-2-3	3.2de	3.2c	4.2d	4.0bcd	3.2cd	3.2e
Blood meal	12-0-0	3.5cd	4.0c	4.5cd	4.0bcd	3.2cd	3.2e
Blood & bone meal	9-6-0	3.2de	4.0c	5.2bcd	3.5cd	3.0cd	3.7de
Scotts Turf builder	31-3-8	4.7bc	7.2b	6.7b	5.5b	5.5b	3.7de
LSD _{0.05} =		1.4	1.5	1.7	1.5	1.4	0.7

		Week 13	Week 14	Week 15	Week 16	Week 17	Total Yield
		g/m ²					
Untreated Check		4.0a	3.0c	3.5c	3.0c	3.0c	74f
Bioyield	5-4-2	4.0a	3.5bc	5.0b	3.7bc	3.7bc	83def
Bioyield	16-4-5	5.2a	5.0a	5.2ab	5.5a	4.7a	198a
Andersons Nutri DG	24-0-10	5.0a	4.0b	4.5b	3.7bc	3.0c	105bc
Canola meal	6-2-1	5.0a	3.7bc	4.5b	4.2b	3.7bc	93cde
Amaizeingly Green	10-0-0	4.2a	3.7bc	4.7b	4.0b	4.0ab	86def
Gaia Green	6-2-3	4.2a	3.5bc	4.5b	4.0b	4.0ab	91cde
Blood meal	12-0-0	4.0a	3.5bc	5.0b	4.2b	4.0ab	95cd
Blood & bone meal	9-6-0	3.7a	3.7bc	6.0a	4.5b	4.2ab	74f
Scotts Turf builder	31-3-8	3.5a	3.5bc	4.7b	4.0b	3.0c	112b
LSD _{0.05} =		n/s	0.7	0.8	0.8	0.7	14.8

* Values that have the same letter as a suffix are not significantly different from each other.

Table 5 – Superior rating and standard deviation for clipping yield, 2009.

		Superior Turf Clipping Yield # weeks	Good Turf Clipping Yiled # weeks	Standard Deviation g/m ²
Untreated Check		2 out of 17	5 out of 17	1.8g
Bioyield	5-4-2	2 out of 17	7 out of 17	3.0g
Bioyield	16-4-5	17 out of 17	17 out of 17	7.3g
Andersons Nutri DG	24-0-10	3 out of 17	13 out of 17	4.7g
Canola meal	6-2-1	2 out of 17	12 out of 17	3.4g
Amaizeingly Green	10-0-0	3 out of 17	9 out of 17	2.9g
Gaia Green	6-2-3	3 out of 17	11 out of 17	3.9g
Blood meal	12-0-0	3 out of 17	11 out of 17	3.9g
Blood & bone meal	9-6-0	4 out of 17	8 out of 17	1.4g
Scotts Turf builder	31-3-8	2 out of 17	15 out of 17	4.4g