

Georgia-Pacific's Nitamin Nfusion (25-0-0) 'Steady-Delivery' Nitrogen Soluble Fertilizer Compared to Simplot's Best Polyon (43-0-0) Controlled-Release Fertilizer on a Fairway Cut Kentucky Bluegrass Turf

Charles T. Golob, William J. Johnston, and Karine Paré
Dept. Crop and Soil Sciences
Washington State University
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A field study was conducted at the Washington State University Turfgrass and Agronomy Research Center (TARC) during the summer of 2007 to evaluate the effects of Nitamin Nfusion (25-0-0) on Kentucky bluegrass (cv. 'Famous') mowed at fairway height (0.5"). A randomized-complete block design was used with four replications and individual treatment plots were 6' x 10'. Nitamin Nfusion treatments were applied 1 Jun 07 with a bicycle-wheeled CO₂ pressurized (40 psi) sprayer. Nitamin Nfusion alone treatment was diluted 1:1 with water and applied at 64 gal/A using 8006 flat fan spray nozzles at a rate of 2 lbs N/1000 ft² and the 4 lbs N/1000 ft² Nitamin Nfusion treatment was sprayed 2 times. The Nitamin Nfusion + Urea (46-0-0) treatment was blended so that 50% nitrogen came from each source and applied at 46 gal/A using 11004 flat fan spray nozzles at a rate of 2 lbs N/1000 ft² and the 4 lbs N/1000 ft² Nitamin Nfusion + Urea treatment was sprayed 2 times. Polyon treatment was applied at the same time using a SS-2 drop spreader. Each week up to 13 weeks after treatment (31 Aug 07) chlorophyll index readings were taken with a Field Scout CM1000 chlorophyll meter (Spectrum Technologies, Inc.). All treatments were mowed 2 times per week at 0.5" with a Jacobsen Greens King IV triplex mower. Immediately prior to the second mowing each week, a 1.75' x 8' swath was mowed at 0.5" with a Jacobsen Greens King IV triplex reel mower to collect clippings. Clippings were dried in a forced air drier at 45°C for 72 hours then weighed. Visual color and turfgrass quality were rated on a scale of 1-9, with 9 equal to dark green or excellent quality, respectively.

Chlorophyll index readings show that the Nitamin Nfusion + Urea 2 lbs N/M had higher index levels of chlorophyll compared to Nitamin Nfusion alone at 2 lbs N/M through 14 Jul 07 (6 WAT) [Table 1 and Figure 1]. This would suggest that the addition of Urea (quick-release) was indeed being taken up by the plant immediately after application. However, at the 4 lbs N/M rate both Nitamin Nfusion alone or with Urea had similar chlorophyll index levels throughout the study. These treatments compared to Polyon at 4 lbs N/M had a higher level of N release from 3 to 6 WAT based on chlorophyll and clipping dry weight (Table 2 and Figure 2). Nitamin Nfusion at 2 lbs N/M, Polyon at the 2 lbs N and 4 lbs N/M did not show an increase in chlorophyll until 5 WAT and did not show a large spike in chlorophyll throughout the study. At 7 WAT, both Polyon treatments had a higher

chlorophyll index than either corresponding Nitamin Nfusion treatment for the remainder of the study, which suggests that N from Polyon is being released at a higher and more prolonged rate than Nitamin Nfusion.

As with chlorophyll, there was a corresponding increase of clipping dry weight 3 WAT to 6 WAT with the 4 lbs N/M Nitamin Nfusion alone or with Urea treatments (Table 2 and Figure 2). However, after 8 WAT there was little difference among any of the 4 lbs N/M treatments. This was also true among any of the 2 lbs N/M treatments. Polyon at 4 lbs N/M had significantly less total clippings over the duration of the study than Nitamin Nfusion 4 lbs N/M or Nitamin Nfusion + Urea blend 4 lbs/M (Table 2a). There was no significant difference in total clipping dry weight among any of the 2 lbs N/M treatments.

Compared to chlorophyll index (Figure 1), a visual color (Figure 3) or turfgrass quality (Figure 4) spike was not observed, following the 4 lbs N/M Nitamin alone or with Urea treatment. However, an increase in chlorophyll index closely matched an increase in visual color of the 2 lbs N/M Nitamin Nfusion + Urea treatment up to 4 WAT (Figures 1 and 3). In addition, both Polyon treatments matched increases in chlorophyll index throughout the study. By 6 WAT, visual color of the Polyon at 4 lbs N/M treatment was significantly higher compared to the 4 lbs N/M Nitamin Nfusion or the 4 lbs N/M Nitamin Nfusion + Urea treatment (Table 3). The Polyon at 2 lbs/M treatment had significantly higher visual color ratings compared to the 2 lbs N/M rate of Nitamin Nfusion or Nitamin Nfusion + Urea treatments. As explained in the chlorophyll results above, it appears that the N of Polyon is being released at a higher and more prolonged rate than Nitamin Nfusion.

Turfgrass quality following either Polyon treatment or Nitamin at 2 lbs N/M did not show an increase until 6 WAT (Figure 4). This response is 3 weeks later than an increase in chlorophyll index and visual color (Figures 1 and 3). Even though color of the turf increased it took another 3 weeks for the turf density to increase resulting in increased turfgrass quality. Turfgrass quality increased immediately after applications of 4 lbs N/M Nitamin Nfusion, 4 lbs N/M Nitamin Nfusion + Urea, or 2 lbs N/M Nitamin Nfusion + Urea (Figure 4 and Table 4).

To summarize, the addition of Urea to the 2 lbs/M rate of the Nitamin Nfusion + Urea treatment had the desired effect as a quick-release of N for plant growth, as seen by increased chlorophyll index and visual color ratings up to 4 WAT, compared to Nitamin Nfusion alone. The controlled-release of N from Polyon was more pronounced than any Nitamin Nfusion treatment. However, it takes up to 4 WAT to see the N release from Polyon. This is also true for Nitamin Nfusion at 2 lbs N/M. Applying Nitamin Nfusion or Nitamin Nfusion + Urea at 4 lbs/M resulted in immediate increases in chlorophyll index, clipping dry weight, visual color, and turfgrass quality. In addition, there was no added benefit of adding Urea at this high N rate, other than it may be less expensive.

Table 1. Effect of different slow-release fertilizers on chlorophyll index of 'Famous' Kentucky bluegrass mowed at fairway height.

Chlorophyll index (1-999)*

Fertilizer treatment	Rate (lbs N/M)	6/4/07	6/8/07	6/15/07	6/22/07	6/29/07	7/7/07	7/14/07	7/21/07	7/28/07	8/4/07	8/11/07	8/18/07	8/25/07	8/31/07
		3 DAT	1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	9 WAT	10 WAT	11 WAT	12 WAT	13 WAT
Nitamin Nfusion (25-0-0) 1:1 dilution	2	280.2	307.6 bcd**	323.1 b	345.2 bc	346.5 d	485.2 b	452.5 d	419.9 d	371.1 c	359.5 cd	360.5 cd	339.8 cd	294.3 c	240.8 bc
Nitamin Nfusion (25-0-0) 1:1 dilution	4	289.0	347.6 ab	393.5 a	471.8 a	458.4 a	682.0 a	592.7 a	503.4 b	410.9 b	412.1 ab	428.0 b	387.2 b	315.0 b	255.8 b
Nitamin Nfusion (50% N) + Urea (50% N) blend	2	297.0	363.0 a	380.2 a	394.0 b	401.4 bc	522.3 b	477.0 cd	431.7 d	364.8 c	354.8 d	355.4 d	326.3 d	280.6 c	232.7 cd
Nitamin Infusion (50% N) + Urea (50% N) blend	4	271.2	327.6 abc	406.1 a	474.8 a	448.4 ab	649.8 a	575.1 ab	500.4 b	409.5 b	371.8 bcd	426.0 b	374.1 bc	316.3 b	251.6 b
Polygon (43-0-0)	2	285.3	309.6 bcd	304.6 b	311.8 c	341.8 d	472.0 b	471.1 d	470.3 c	406.5 b	405.9 abc	395.1 bc	365.8 bc	319.8 b	255.9 b
Polygon (43-0-0)	4	275.5	301.0 cd	302.6 b	309.3 c	355.0 cd	513.1 b	529.7 bc	546.4 a	446.5 a	449.3 a	497.9 a	442.8 a	371.3 a	287.7 a
CHECK	0	266.2	277.4 d	258.4 c	248.9 d	234.0 e	281.6 c	301.2 e	320.8 e	306.2 d	286.6 e	291.2 e	281.1 e	250.0 d	218.0 d

*Chlorophyll index 1-999: 999 = high chlorophyll content.

**Values within the same column with the same letter are not significantly different LSD P = 0.05.

Figure 1. Effect of different slow-release fertilizers on chlorophyll content of 'Famous' Kentucky bluegrass mowed at fairway height.

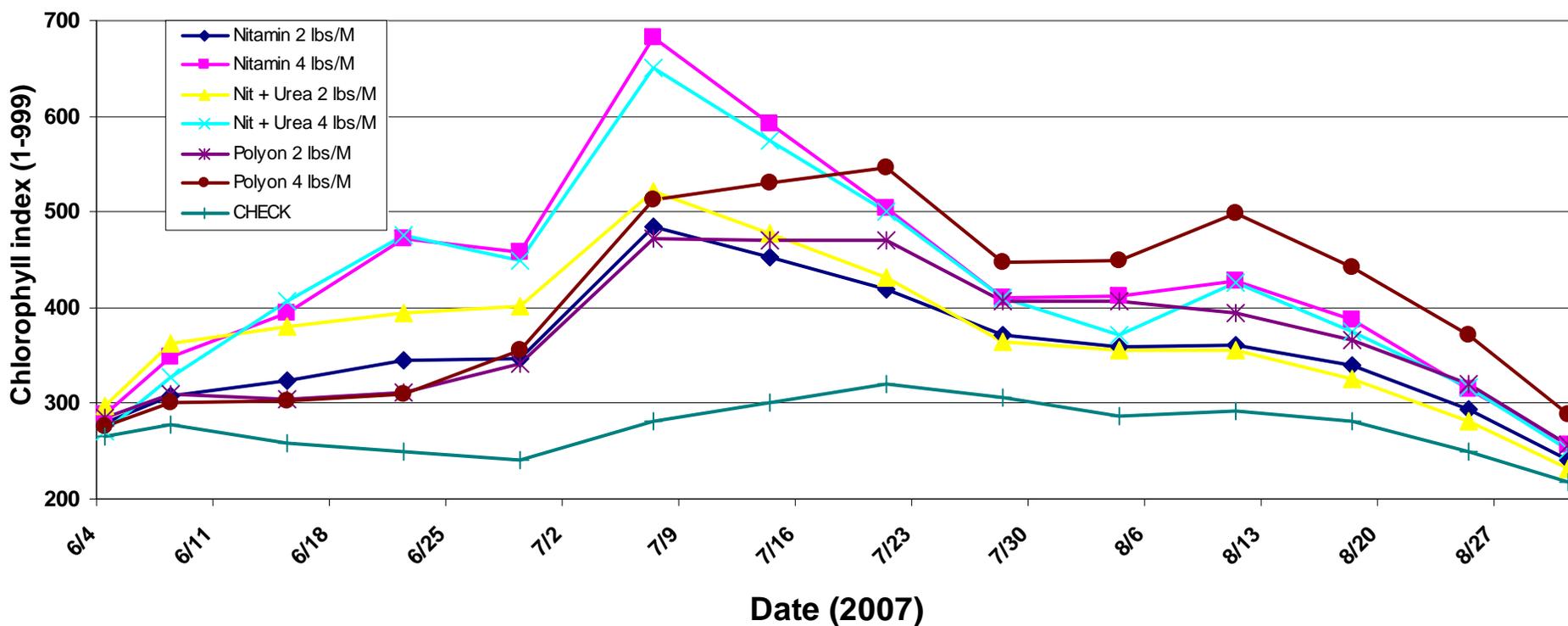


Table 2. Effect of different slow-release fertilizers on clipping dry weight of 'Famous' Kentucky bluegrass mowed at fairway height.

Clipping dry weight (g/1 ft²)

Fertilizer treatment	Rate	6/4/07	6/8/07	6/15/07	6/22/07	6/29/07	7/7/07	7/14/07	7/21/07	7/28/07	8/4/07	8/11/07	8/18/07	8/25/07	8/31/07
	(lbs N/M)	3 DAT	1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	9 WAT	10 WAT	11 WAT	12 WAT	13 WAT
Nitamin Nfusion (25-0-0) 1:1 dilution	2		1.04	0.68 bcd*	1.06 b	1.01 bc	1.34 bc	1.05 c	0.99 b	0.66 b	0.43 de	1.16 cd	1.19 c	1.20 bc	0.69 cd
Nitamin Nfusion (25-0-0) 1:1 dilution	4		1.13	0.92 ab	1.68 a	1.87 a	3.23 a	2.16 a	1.64 a	1.00 ab	0.92 ab	2.06 a	1.71 a	1.45 ab	0.86 abc
Nitamin Nfusion (50% N) + Urea (50% N) blend	2		0.96	0.79 abc	1.11 b	1.10 b	1.64 b	1.14 c	1.16 b	0.79 ab	0.54 cd	1.27 bc	1.17 cd	1.17 bc	0.71 bcd
Nitamin Nfusion (50% N) + Urea (50% N) blend	4		1.15	1.09 a	1.87 a	1.93 a	3.40 a	1.90 ab	1.79 a	1.05 a	0.96 a	1.70 ab	1.52 abc	1.44 ab	0.88 ab
Polygon (43-0-0)	2		0.70	0.47 cd	0.63 c	0.67 cd	1.05 bc	0.96 c	1.12 b	0.81 ab	0.71 bc	1.35 bc	1.23 bc	1.24 b	0.60 de
Polygon (43-0-0)	4		1.14	0.69 bcd	0.88 bc	1.02 bc	1.70 b	1.66 b	1.74 a	1.00 ab	1.00 a	1.62 abc	1.62 ab	1.68 a	0.98 a
CHECK	0		0.91	0.44 d	0.52 c	0.52 d	0.38 c	0.50 d	0.55 c	0.26 c	0.29 e	0.76 d	0.78 d	0.92 c	0.44 e

*Values within the same column with the same letter are not significantly different LSD P = 0.05.

Figure 2. Effect of different slow-release fertilizers on clipping dry weight of 'Famous' Kentucky bluegrass mowed at fairway height.

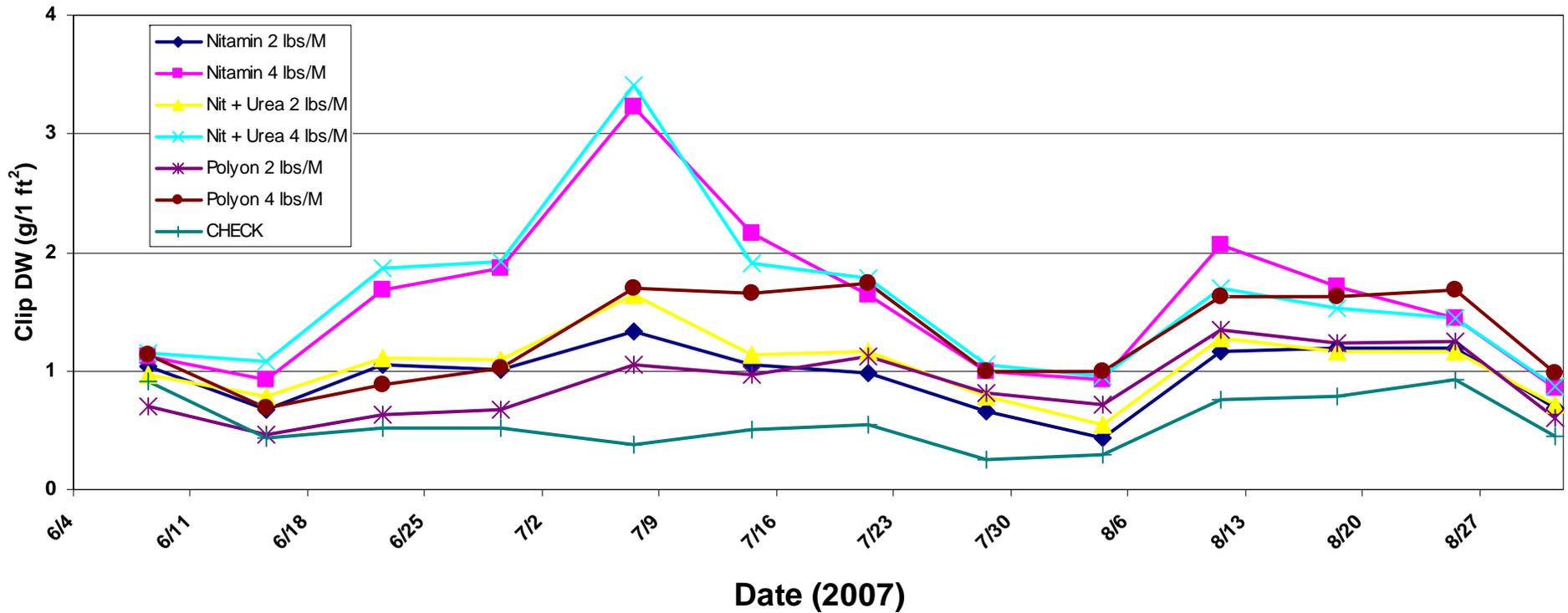


Table 2a. Effect of different slow-release fertilizers on total clipping dry weight over the duration of the study of 'Famous' Kentucky bluegrass mowed at fairway height.

Fertilizer treatment	Total clipping	
	Rate (lbs N/M)	Dry weight (g)
Nitamin Nfusion (25-0-0) 1:1 dilution	2	12.5 c*
Nitamin Nfusion (25-0-0) 1:1 dilution	4	20.6 a
Nitamin Nfusion (50% N) + Urea (50% N) blend	2	13.6 c
Nitamin Nfusion (50% N) + Urea (50% N) blend	4	20.7 a
Polyon (43-0-0)	2	11.6 c
Polyon (43-0-0)	4	16.8 b
CHECK	0	7.3 d

*Values within the same column with the same letter are not significantly different LSD P = 0.05.

Table 3. Effect of different slow-release fertilizers on visual color of 'Famous' Kentucky bluegrass mowed at fairway height.

Visual color (rated 1-9)*

Fertilizer treatment	Rate	6/4/07	6/8/07	6/15/07	6/22/07	6/29/07	7/7/07	7/14/07	7/21/07	7/28/07	8/4/07	8/11/07	8/18/07	8/25/07	8/31/07
	(lbs N/M)	3 DAT	1 WAT	2 WAT	3 WAT	4 WAT	5 WAT	6 WAT	7 WAT	8 WAT	9 WAT	10 WAT	11 WAT	12 WAT	13 WAT
Nitamin Nfusion (25-0-0) 1:1 dilution	2	5.5	5.5 c**	5.5 c	5.5 bc	6.3 c	6.5 c	5.8 c	6.0 d	5.8 c	5.3 d	5.0 d	5.0 c	5.0 cd	5.0 b
Nitamin Nfusion (25-0-0) 1:1 dilution	4	5.5	6.5 ab	6.8 a	7.5 a	7.8 a	7.5 ab	6.8 b	7.0 bc	6.8 ab	6.5 b	6.5 bc	6.5 b	6.0 b	5.5 b
Nitamin Nfusion (50% N) + Urea (50% N) blend	2	5.3	6.8 a	6.0 b	6.3 b	6.3 c	6.0 c	6.0 bc	6.0 d	5.8 c	5.5 cd	5.0 d	5.0 c	4.8 d	4.8 b
Nitamin Nfusion (50% N) + Urea (50% N) blend	4	5.0	5.8 bc	7.0 a	7.5 a	7.5 ab	7.8 a	6.5 bc	6.5 cd	6.5 bc	6.3 bc	6.0 c	6.0 b	5.5 bc	5.0 b
Polygon (43-0-0)	2	5.3	5.5 c	5.0 d	4.8 c	6.8 bc	6.8 bc	6.8 b	7.3 ab	6.8 ab	6.8 b	6.8 b	6.3 b	6.0 b	5.5 b
Polygon (43-0-0)	4	5.8	5.8 bc	5.5 c	5.5 bc	7.5 ab	8.0 a	7.8 a	7.8 a	7.5 a	8.0 a	8.0 a	7.8 a	7.8 a	7.0 a
CHECK	0	4.8	5.5 c	4.8 d	3.8 d	4.0 d	3.8 d	3.8 d	3.5 e	3.8 d	3.8 e	3.8 e	3.8 d	3.8 e	3.8 e

*Visual color rated 1-9: 9 = dark green.

**Values within the same column with the same letter are not significantly different LSD P = 0.05.

Figure 3. Effect of different slow-release fertilizers on visual color of 'Famous' Kentucky bluegrass mowed at fairway height.

