Georgia-Pacific's Nitamin® 30L (30-0-0) and Blends of Nfusion® (25-0-0) 'Steady-Delivery'® Nitrogen Soluble Fertilizer Compared to UMAXX® (47-0-0) StabilizedNitrogen™ Fertilizer on a Perennial Ryegrass Lawn

Charles T. Golob, William J. Johnston, and Matt Williams
Dept. Crop and Soil Sciences
Washington State University
January 6, 2009

A field study was conducted at the Washington State University Turfgrass and Agronomy Research Center (TARC) in Pullman, WA during the summer of 2008 to evaluate the effects of Nitamin 30L and Nfusion blended with Urea (46-0-0) or UAN (32-0-0) and compared to UMAXX on perennial ryegrass (cv. 'Gallery') mowed at 1.5". A randomized-complete block design was used with four replications and individual treatment plots were 6' x 10'. Nitamin 30L was diluted 1:1 with water. Three soluble fertilizer blends were used: Nfusion (15%) + Urea (85%), Nfusion (40%) + Urea (60%), and Nfusion (40%) + UAN (60%). Soluble fertilizer treatments were applied 22 May 08 and 22 Jul 08 (9 weeks after initial treatment (WAIT)) with a bicycle-wheeled CO_2 pressurized (40 psi) sprayer using 11002 flat fan nozzles. Each plot was sprayed 2 times at approximately 25 gpa rate to achieve the desired nitrogen rate of 1.5 lbs N/M at each application date. UMAXX granular fertilizer was applied by hand at 1.5 lbs N/M at each application date. Each week, up to 18 WAIT, chlorophyll index readings were taken with a Field Scout CM1000 chlorophyll meter (Spectrum Technologies, Inc.). Clippings were collected once per week using a Toro rearbag mower, with mowing height set at 1.5". Clippings were dried in a forced-air drier at 45°C for 72 hours then weighed. Visual turfgrass quality and color were rated on a scale of 1-9, with 9 equal to excellent quality or dark green color, respectively. Turfgrass quality rating of 6 is considered acceptable.

After the first application of fertilizer at 1.5 lbs N/M on 22 May, there was little difference in chlorophyll readings between any of the Nitamin 30L or the 3 Nfusion blend treatments up to 8 WAIT (Table 1 and Figure 1). However, the UMAXX fertilizer treatment had the highest chlorophyll readings over this same time period. Following the second application of fertilizer on 22 July, UMAXX treated turf resulted in very high levels of chlorophyll from 10 to 13 WAIT compared to the other fertilizer treatments. Nfusion (15% N) + Urea (85%) and Nfusion (40% N) + UAN (60% N) resulted in very similar chlorophyll readings and at levels that were higher than Nitamin 30L or Nfusion (40%) + Urea (60%) through 18 WAIT. By 15 WAIT there was no difference in chlorophyll content between Nfusion (15% N) + Urea (85%), Nfusion (40% N) + UAN (60% N), or UMAXX.

As with chlorophyll content, clipping dry weight for the UMAXX treatment was generally higher compared to the other treatments through 8 WAIT following the first fertilizer application (Table 2 and Figure 2). There was little difference between the Nitamin 30L or the 3 Nfusion blend treatments during this same time period. However, following the second fertilizer application on 22 July, there was a dramatic increase in the UMAXX clipping dry weight from 11 to 13 WAIT compared to the other fertilizer treatments. Nfusion (40% N) + Urea (60% N) generally had the lowest clipping dry weight (except for the check), up to 18 WAIT compared to the other fertilizer treatments.

In general, UMAXX maintained the highest turfgrass quality and color ratings throughout the study (Tables 3 and 4 and Figures 3 and 4). Up to 5 WAIT, Nfusion (15% N) + Urea (85% N) and UMAXX had higher turfgrass quality and color compared to Nitamin 30L or the other 2 Nfusion blends. After the second application, Nfusion (15% N) + Urea (85% N) and Nfusion (40% N) + UAN (60% N) resulted in higher quality and color, for the most part, compared to Nitamin 30L or Nfusion (40% N) + Urea (60% N).

Along with the higher chlorophyll readings, turfgrass quality and color, UMAXX also had higher clipping dry weights than the other fertilizer treatments up to 15 WAIT. Following the first application, there was little difference in chlorophyll readings, clipping dry weight, turfgrass quality and color between Nitamin 30L or the 3 Nfusion blends. However, following the second application, Nfusion (15% N) + Urea (85% N) and Nfusion (40% N) + UAN (60% N) resulted in higher chlorophyll readings, turfgrass quality and color for most of the remaining 18 WAIT compared to Nitamin 30L or Nfusion (40% N) + Urea (60% N). For the most part, clipping dry weight was similar among the Nitamin 30L and the Nfusion treatments except for Nfusion (40% N) + Urea (60% N) which tended to be lower.

Table 1. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on chlorophyll readings of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

			Chlorophyll Index*						
Fertilizer treatment	App. dates	Rate (lbs N/M)	6/5/08 2 WAIT**	6/12/08 3 WAIT	6/19/08 4 WAIT	6/26/08 5 WAIT	7/3/08 6 WAIT	7/10/08 7 WAIT	7/17/08 8 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	354.1 bc***	376.6 bc	362.2 b	368.7 b	393.5 b	348.2 b	182.6 bc
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	371.4 b	387.9 b	372.3 b	365.0 b	395.3 b	345.8 b	195.3 ab
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	372.5 b	385.5 b	383.4 b	374.3 b	394.9 b	352.7 b	203.2 ab
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	325.1 c	349.7 c	350.1 b	361.2 b	408.3 b	349.7 b	186.2 bc
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	407.7 a	471.0 a	471.4 a	420.6 a	463.6 a	413.0 a	225.9 a
CHECK		0	272.6 d	277.5 d	259.2 c	288.4 c	285.5 c	278.2 c	156.7 c

*Chlorophyll index 0 - 999; with 999 = high chlorophyll content.

**WAIT (weeks after initial treatment)

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

			Chlorophyll Index*								
Fertilizer treatment	App. dates	Rate (lbs N/M)	7/31/08 10 WAIT**	8/7/08 11 WAIT	8/14/08 12 WAIT	8/21/08 13 WAIT	8/28/08 14 WAIT	9/4/08 15 WAIT	9/11/08 16 WAIT	9/18/08 17 WAIT	9/25/08 18 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	399.9 c***	384.6 c	360.8 c	389.0 c	334.8 c	280.7 b	285.0 c	337.7 bc	322.0 bc
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	503.5 b	448.2 b	419.8 b	434.0 b	370.6 b	307.1 a	319.5 ab	358.7 ab	345.6 ab
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	400.8 c	390.5 c	355.8 c	398.3 c	337.6 c	276.8 b	295.4 bc	319.0 c	304.4 c
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	499.6 b	444.6 b	429.4 b	459.1 b	385.0 b	311.0 a	317.4 ab	372.5 a	363.5 a
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	730.4 a	593.9 a	515.7 a	508.7 a	412.6 a	316.6 a	334.1 a	369.8 a	362.2 a
CHECK		0	260.6 d	271.3 d	254.2 d	299.4 d	263.4 d	227.4 c	234.7 d	267.7 d	251.5 d

*Chlorophyll index 0 - 999; with 999 = high chlorophyll content.

**WAIT (weeks after initial treatment).

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

Figure 1. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on chlorophyll readings of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

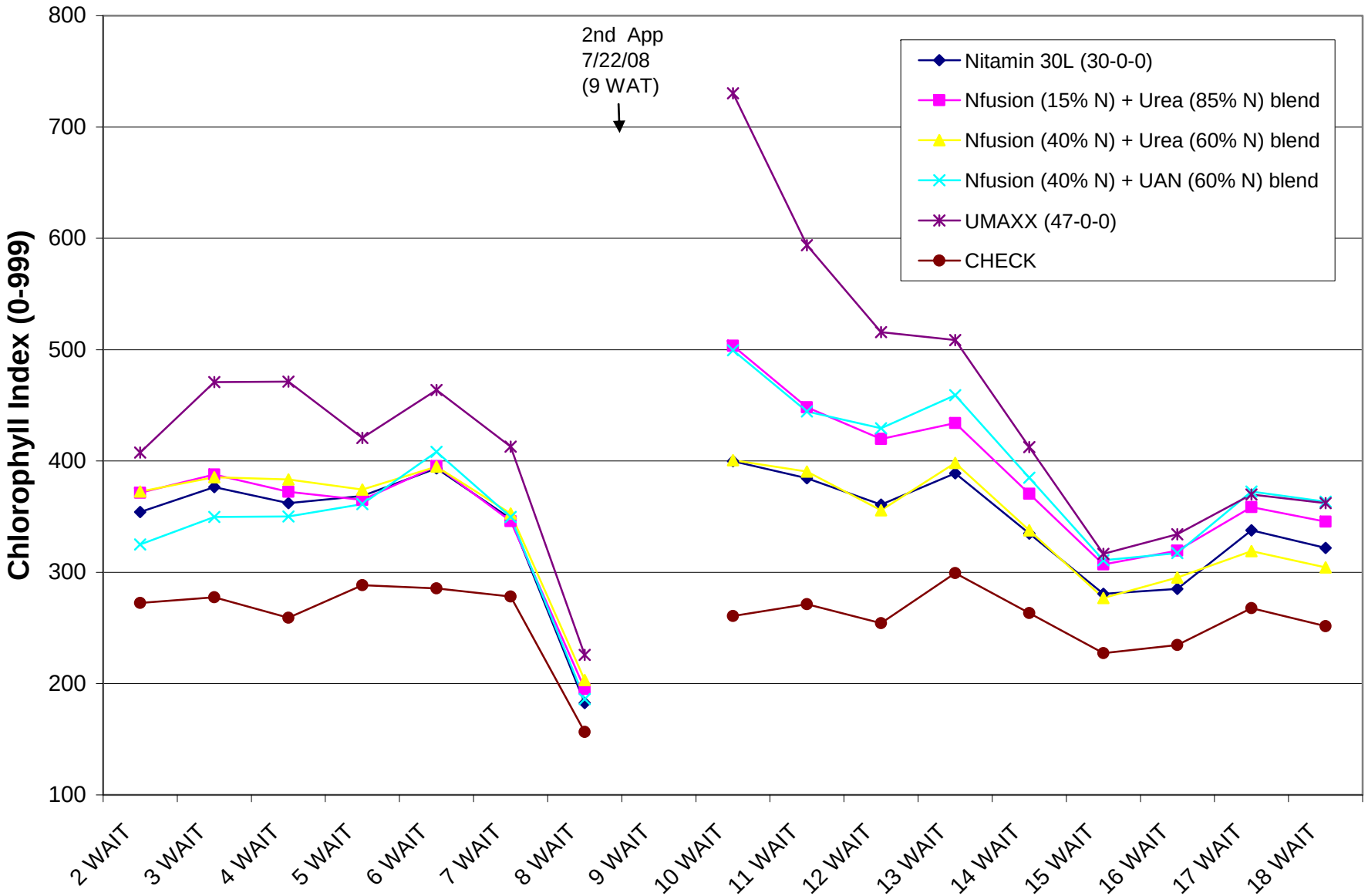

Table 2. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on clipping dry weight of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

			Clipping dry wt. (g/1 ft^2)							
Fertilizer treatment	App. dates	Rate (lbs N/M)	5/30/08 1 WAIT*	6/5/08 2 WAIT	6/12/08 3 WAIT	6/19/08 4 WAIT	6/26/08 5 WAIT	7/3/08 6 WAIT	7/10/08 7 WAIT	7/17/08 8 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	0.24 c**	0.29 b	0.50 b	0.50 b	0.23 ab	0.32 b	0.43 ab	0.29 ab
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	0.37 ab	0.39 ab	0.48 b	0.51 b	0.18 ab	0.31 b	0.31 b	0.25 bc
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	0.30 bc	0.34 ab	0.39 b	0.47 bc	0.30 ab	0.30 b	0.39 ab	0.20 bc
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	0.33 bc	0.34 ab	0.43 b	0.46 bc	0.34 a	0.33 b	0.48 ab	0.23 bc
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	0.45 a	0.50 a	0.70 a	0.80 a	0.37 a	0.57 a	0.56 a	0.34 a
CHECK		0	0.10 d	0.11 c	0.34 b	0.29 c	0.04 b	0.08 c	0.31 b	0.16 c

*WAIT (weeks after initial treatment)

**Means within a column followed by the same letter are not significantly different. LSD P = 0.05.

			Clipping dry wt. (g/1 ft^2)								
Fertilizer treatment	App. dates	Rate (lbs N/M)	7/31/08 10 WAIT*	8/7/08 11 WAIT	8/14/08 12 WAIT	8/21/08 13 WAIT	8/28/08 14 WAIT	9/4/08 15 WAIT	9/11/08 16 WAIT	9/18/08 17 WAIT	9/25/08 18 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	0.42 bc**	0.48 bc	0.33 b	0.43 bc	0.33 b	0.27 bc	0.29 ab	0.37 ab	0.18 ab
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	0.53 ab	0.57 b	0.40 b	0.43 bc	0.35 ab	0.30 abc	0.31 ab	0.34 ab	0.22 a
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	0.25 cd	0.28 cd	0.29 b	0.32 c	0.30 b	0.20 cd	0.40 a	0.28 bc	0.10 bc
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	0.48 ab	0.61 b	0.37 b	0.50 b	0.41 ab	0.36 ab	0.33 ab	0.37 ab	0.21 a
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	0.61 a	1.3 a	0.72 a	0.80 a	0.46 a	0.40 a	0.40 a	0.42 a	0.26 a
CHECK		0	0.16 d	0.23 d	0.15 c	0.12 d	0.10 c	0.13 d	0.15 b	0.21 c	0.07 c

*WAIT (weeks after initial treatment)

**Means within a column followed by the same letter are not significantly different. LSD P = 0.05.

Figure 2. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on clipping dry weight of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

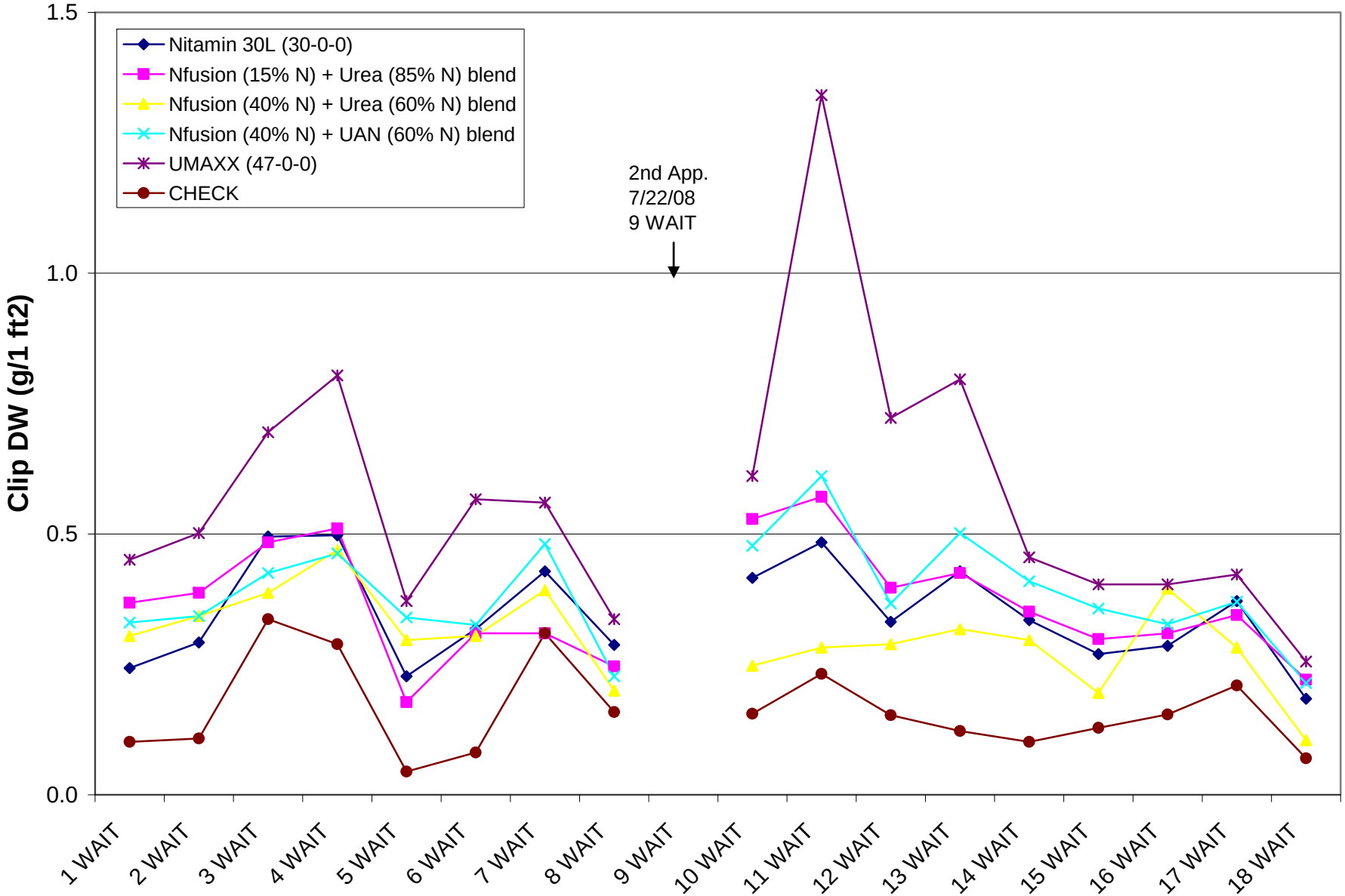

Table 3. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on turfgrass quality of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

			Turfgrass quality*								
Fertilizer treatment	App. dates	Rate (lbs N/M)	5/30/08 1 WAIT**	6/5/08 2 WAIT	6/12/08 3 WAIT	6/19/08 4 WAIT	6/26/08 5 WAIT	7/3/08 6 WAIT	7/10/08 7 WAIT	7/17/08 8 WAIT	7/24/08 9 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	5.3 c***	6.5 ab	6.5 bc	6.8 b	7.0 ab	6.8 a	7.0 a	6.3 a	6.0 cd
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	6.0 ab	7.0 ab	7.3 ab	7.0 ab	7.0 ab	6.8 a	6.8 a	6.5 a	7.0 b
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.5 bc	6.3 b	6.3 c	7.0 ab	7.0 ab	7.0 a	6.8 a	6.3 a	5.8 d
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.3 c	6.3 b	6.5 bc	6.5 b	6.5 b	6.8 a	6.8 a	6.3 a	6.8 bc
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	6.3 a	7.3 a	7.8 a	7.5 a	7.5 a	7.5 a	7.3 a	6.8 a	8.0 a
CHECK		0	3.5 d	4.0 c	4.0 d	4.0 c	4.5 c	4.0 b	4.8 b	5.3 b	4.0 e

*Turfgrass quality rated 1-9 with 9 = excellent.

**WAIT (weeks after initial treatment)

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

			Turfgrass quality*								
Fertilizer treatment	App. dates	Rate (lbs N/M)	7/31/08 10 WAIT**	8/7/08 11 WAIT	8/14/08 12 WAIT	8/21/08 13 WAIT	8/28/08 14 WAIT	9/4/08 15 WAIT	9/11/08 16 WAIT	9/18/08 17 WAIT	9/25/08 18 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	5.8 c***	6.3 bc	6.3 c	6.5 b	6.3 cd	6.0 b	6.3 ab	5.3 b	5.8 ab
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	6.5 bc	7.0 b	7.3 ab	7.0 b	7.0 bc	6.3 ab	6.5 ab	6.0 ab	6.3 a
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.8 c	5.8 c	6.0 c	5.5 c	6.0 b	6.3 ab	6.0 b	5.3 b	5.3 b
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	6.8 ab	6.8 b	6.8 bc	7.3 ab	7.3 ab	6.3 ab	6.3 ab	6.0 ab	6.3 a
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	7.5 a	8.0 a	8.0 a	8.0 a	8.0 a	7.0 a	7.0 a	6.5 a	6.5 a
CHECK		0	4.0 d	4.0 d	4.3 d	4.3 d	4.0 e	4.8 c	4.8 c	3.8 c	3.5 c

*Turfgrass quality rated 1-9 with 9 = excellent.

**WAIT (weeks after initial treatment)

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

Figure 3. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on turfgrass quality of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

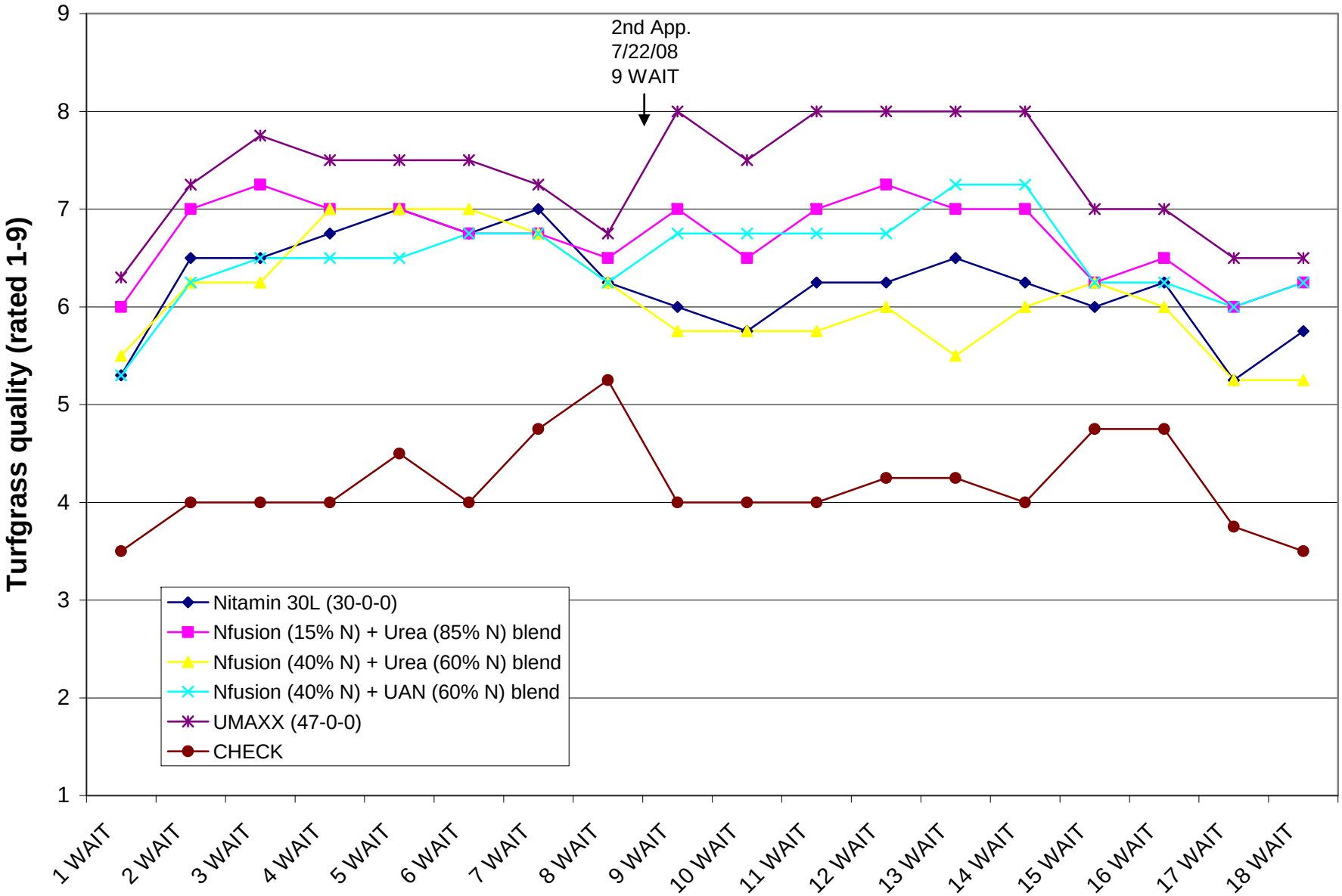

Table 4. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on turfgrass color of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.

			Color*								
Fertilizer treatment	App. dates	Rate (lbs N/M)	5/30/08 1 WAIT**	6/5/08 2 WAIT	6/12/08 3 WAIT	6/19/08 4 WAIT	6/26/08 5 WAIT	7/3/08 6 WAIT	7/10/08 7 WAIT	7/17/08 8 WAIT	7/24/08 9 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	5.3 c***	6.5 bc	6.5 c	6.8 bc	7.0 bc	6.8 b	7.0 a	6.5 a	6.0 cd
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	6.0 b	7.3 ab	7.3 b	7.0 b	7.3 b	7.0 ab	7.0 a	6.5 a	7.0 b
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.5 bc	6.3 c	6.3 c	7.0 b	7.0 bc	7.0 ab	7.0 a	6. ab	5.8 d
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.0 c	6.5 bc	6.5 c	6.5 c	6.5 c	7.0 ab	7.0 a	6.8 a	6.8 bc
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	6.8 a	7.5 a	8.0 a	8.0 a	8.0 a	8.0 a	7.3 a	7.3 a	8.0 a
CHECK		0	3.5 d	4.0 d	4.0 d	4.0 d	4.3 d	3.8 c	5.0 b	5.3 b	4.0 e

*Color rated 1-9 with 9 = dark green.

**WAIT (weeks after initial treatment)

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

			Color*								
Fertilizer treatment	App. dates	Rate (lbs N/M)	7/31/08 10 WAIT**	8/7/08 11 WAIT	8/14/08 12 WAIT	8/21/08 13 WAIT	8/28/08 14 WAIT	9/4/08 15 WAIT	9/11/08 16 WAIT	9/18/08 17 WAIT	9/25/08 18 WAIT
Nitamin 30L (30-0-0)	5/22 & 7/22	1.5 & 1.5	5.8 c***	5.8 c	6.3 b	6.3 b	5.8 c	6.3 ab	6.0 bc	5.3 c	6.0 b
Nfusion (15% N) + Urea (85% N) blend	5/22 & 7/22	1.5 & 1.5	6.5 bc	7.0 b	7.0 b	6.8 ab	6.3 bc	6.3 ab	6.3 b	6.3 ab	7.0 a
Nfusion (40% N) + Urea (60% N) blend	5/22 & 7/22	1.5 & 1.5	5.8 c	6.0 c	6.3 b	6.0 b	5.8 c	5.8 b	5.5 c	5.3 c	6.0 b
Nfusion (40% N) + UAN (60% N) blend	5/22 & 7/22	1.5 & 1.5	6.8 b	6.8 b	6.8 b	6.8 ab	6.8 b	6.5 ab	6.0 bc	6.0 b	7.0 a
UMAXX (47-0-0)	5/22 & 7/22	1.5 & 1.5	8.0 a	8.0 a	8.0 a	7.8 a	7.5 a	7.0 a	7.0 a	6.8 a	7.0 a
CHECK		0	4.0 d	4.0 d	4.3 c	4.5 c	4.3 d	4.8 c	4.8 d	4.0 d	4.0 c

*Color rated 1-9 with 9 = dark green.

**WAIT (weeks after initial treatment)

***Means within a column followed by the same letter are not significantly different. LSD *P* = 0.05.

Figure 4. The effect of Nitamin 30L, three Nfusion fertilizer blends, and UMAXX on turfgrass color of a 'Gallery' perennial ryegrass lawn. Pullman, WA 2008.