Stop #4a: Evaluation of Fertilizer Products and Formulations on Bermudagrass Turf

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Objectives:

This study was conducted to evaluate granular and liquid formulations of products from Anuvia Plant Nutrients alone or in combination with industry standards for longevity and quality on bermudagrass turf maintained as a golf course fairway or athletic field.

Materials and methods:

The study was conducted on mature 'GN-1' hybrid bermudagrass turf on a Hanford fine sandy loam. Turf was mowed 3 days/wk at 0.5 inches and received no fertilizer in 2018 before the study began. Fertilizer treatments were initiated on May 23, 2018. Granular treatments were applied 4 times in 6-wk intervals, twice in 8-wk intervals or once at the beginning of the study and then after 4 weeks, followed by liquid formulations. Liquid treatments were sprayed every 2 wks for a total of 12 applications using a CO_2-powered backpack sprayer with TeeJet 8003VS nozzles calibrated to deliver 2 gallons/1000 ft^2. Experimental design was a randomized block with 4 replications. Plot size was 6×10 ft with 1-ft alleys.

Plots were evaluated biweekly for visual turf quality (1-9; 9=highest) and visual color estimation (1-9; 9=highest) starting from May 23, 2018. NDVI measurements and photos for Digital Image Analysis were also taken at each rating date.

Results:

Statistical analysis showed no significant differences among treatments in terms of visual quality except on July 3, 2018, when plots treated with Replenish demonstrated lower quality in comparison to other treatments, and on August 13, 2018, when plots treated with Polyon 43 Mini alone showed lower quality than plots treated with a combination of this fertilizer and GreenTRX. Overall decrease in turf quality on August 13 was due to verticutting performed in the week preceding this rating event. Fertilizer application on August 15 expedited recovery from verticutting injury that was demonstrated on August 30, 2018, although no significant differences among treatments were found on this date. Also, even though no significant differences were shown among treatments on July 16, 2018, overall visual quality at this date was the highest before the verticutting was performed, as well as in general by the date of this publication.

Statistically significant differences in color among treatments were also found on July 3, when Replenish showed the lowest green color intensity of all treatments. On the

other hand, both Polyon treatments showed higher color intensity in comparison to treatments with GreenTRX product. On July 16, rapid green up was demonstrated by treatments applied on July 5 and included GreenTRX alone, Replenish and first application of liquid fertilizer formulations. Similar to visual quality, green color intensity values also decreased after verticutting on the August 13 rating date followed by recovery on August 30. On this date highest color intensity values were demonstrated by all treatments containing GreenTRX and Polyon 43 Mini, significantly higher in comparison to all of the remaining treatments. In addition LF180607CONT showed the lowest green color intensity on this date.

NDVI ratings taken on June 19 reflect the increase of plant vigor since May 23, 2018 as well color ratings taken on the same day (data not shown), showing that Polyon 43 Mini treatment alone and mixed with GreenTRX resulted in significantly higher color than GreenTRX alone or UMAXX 46-0-0. No significant differences in NDVI were shown among treatments after verticutting, which confirms that injury was similar to all plots throughout the study. On August 30, recovery rate was higher from granular treatments containing blends of GreenTRX fertilizer with Signature and/or Polyon 43 Mini in comparison to all liquid formulations.

Acknowledgments:

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Table 1. Fertilizer treatments applied in study. Riverside, CA, 2018.

No.	Treatment	Analysis	Company	Rate (lb N/M)	Total applications (frequency)	Timing*
1	100% GreenTRX	16-1-2-17S-3Fe	Anuvia	1	4 (6 wks)	ADGJ
2	100% Polyon 43 Mini	43-0-0	Harrell's	2	2 (8 wks)	AG
3*	50% GreenTRX**	16-1-2-17S-3Fe	Anuvia	2	2 (8 wks)	AG
	50% Polyon 43 Mini**	43-0-0	Harrell's			
4*	50% GreenTRX**	16-1-2-17S-3Fe	Anuvia	2	2 (8 wks)	AG
	50% Signature**	39-0-0	Loveland			
5	100% Replenish	10-2-5	EarthWorks	1	4 (6 wks)	ADGJ
6	100% GreenTRX	16-1-2-17S-3Fe	Anuvia	1	1 (initial only)	A
	100% LF180607A	12-0-12	Anuvia	0.25	12 (2 wks)	C-N
7	100% GreenTRX	16-1-2-17S-3Fe	Anuvia	1	1 (initial only)	A
	100% LF180607CONT	12-0-12	Anuvia	0.25	12 (2 wks)	C-N
8	100% UMAXX 46-0-0***	46-0-0	Simplot	1	1 (initial only)	A
	100% UMAXX 46-0-0****	46-0-0	Simplot	0.25	12 (2 wks)	C-N

** Fertilizer granules of both products blended together before application of Treatments 3 and 4.

*** Granular formulation of UMAXX used for initial application only

**** Liquid formulation of UMAXX used for following applications

***Timing**

A	5/23/2018
B	-
C	6/22/2018
D	7/5/2018
E	7/17/2018
F	8/1/2018
G	8/15/2018
H	8/29/2018
I	9/12/2018
J	9/25/2018
K	10/9/2018
L	10/23/2018
M	11/6/2018
N	11/20/2018

Fertility Trial Plot Plan

(12 G 1 W) →N

108 Trt 8	107 Trt 7	106 Trt 6	105 Trt 5	104 Trt 4	103 Trt 3	102 Trt 2	101 Trt 1
208 Trt 6	207 Trt 2	206 Trt 5	205 Trt 8	204 Trt 1	203 Trt 7	202 Trt 4	201 Trt 3
308 Trt 7	307 Trt 3	306 Trt 1	305 Trt 4	304 Trt 6	303 Trt 8	302 Trt 2	301 Trt 5
408 Trt 1	407 Trt 5	406 Trt 8	405 Trt 2	404 Trt 7	403 Trt 4	402 Trt 3	401 Trt 6

Table 2. Effect of fertilizers on visual turf quality (1-9; 9=highest) and visual color (1-9; 9=highest) of bermudagrass. Riverside, CA, 2018.

No.	Treatment	Visual Quality			
		07/03	07/16	08/13	08/30
1	100% GreenTRX	5.8 AB*	7.8**	3.3 AB*	7.3**
2	100% Polyon 43 Mini	6.5 A	7.0	2.3 C	7.0
3	50% GreenTRX + 50% Polyon 43 Mini	6.5 A	7.3	3.5 AB	7.5
4	50% GreenTRX + 50% Signature	6.0 AB	7.3	3.0 BC	7.8
5	100% Replenish	4.5 C	7.5	4.0 A	6.5
6	100% GreenTRX + 100% LF180607A	5.8 AB	7.8	2.8 BC	6.0
7	100% GreenTRX + 100% LF180607CONT	5.5 B	7.5	3.0 BC	5.8
8	100% UMAXX 46-0-0 + 100% UMAXX 46-0-0	5.5 B	7.5	3.5 AB	6.3
No.	Treatment	Color			
		07/03	07/16	08/13	08/30
1	100% GreenTRX	6.0 BC*	8.8 A*	4.0**	8.3 A*
2	100% Polyon 43 Mini	7.0 AB	6.8 C	2.5	8.3 A
3	50% GreenTRX + 50% Polyon 43 Mini	7.5 A	7.5 BC	3.3	8.8 A
4	50% GreenTRX + 50% Signature	6.5 ABC	7.3 BC	3.5	8.5 A
5	100% Replenish	4.3 D	8.0 AB	4.8	7.0 B
6	100% GreenTRX + 100% LF180607A	5.5 C	7.8 B	3.8	6.8 B
7	100% GreenTRX + 100% LF180607CONT	5.8 C	7.8 B	4.0	5.5 C
8	100% UMAXX 46-0-0 + 100% UMAXX 46-0-0	5.5 C	7.8 B	3.5	6.5 B

*Means followed by the same letter in a column are not significantly different (P=0.05)
**Means not followed by any letter in a column are not significantly different (P=0.05)

Table 2. Effect of fertilizers on NDVI of bermudagrass. Riverside, CA, 2018.

No.	Treatment	NDVI			
		05/23	06/19	08/13	08/30
1	100% GreenTRX	0.49**	0.68 C*	0.30**	0.71 ABC*
2	100% Polyon 43 Mini	0.48	0.74 A	0.28	0.70 BC
3	50% GreenTRX + 50% Polyon 43 Mini	0.49	0.73 A	0.30	0.74 A
4	50% GreenTRX + 50% Signature	0.49	0.72 AB	0.28	0.74 A
5	100% Replenish	0.49	0.68 C	0.31	0.72 AB
6	100% GreenTRX + 100% LF180607A	0.47	0.69 BC	0.32	0.69 BC
7	100% GreenTRX + 100% LF180607CONT	0.48	0.67 C	0.29	0.68 BC
8	100% UMAXX 46-0-0 + 100% UMAXX 46-0-0	0.45	0.69 BC	0.29	0.68 C

*Means followed by the same letter in a column are not significantly different (P=0.05)
**Means not followed by any letter in a column are not significantly different (P=0.05)