Evaluation of Slow-Release Nitrogen Products Applied on Arizona Common Bermudagrass During the Summer Season of 2000 in Riverside, Calif.

Final Report

SUBMITTED BY:

Robert Green
Bill Richie
Grant Klein

SPONSORED BY:

TRI-Pro, Inc.

and

University of California, Riverside

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Table 1. Materials and methods outline for the evaluation of slow-release nitrogen products applied on Arizona common bermudagrass during the summer season of 2000 in Riverside, Calif.

Objective

To evaluate the performance of slow-release nitrogen fertilizers, in terms of visual turfgrass quality and color ratings, applied during the warm season on Arizona common bermudagrass that is maintained similar to fairway conditions.

Cultivar

Arizona common bermudagrass [*Cynodon dactylon* (L.) Pers.].

Experimental Site

The plot is located at the UCR Turfgrass Field Research Facility, Riverside, Calif. and was seeded during May 1999. The root zone is a native soil which is classified as a Hanford fine sandy loam. A soil textural analysis in Oct. 1996 showed the following: sand = 42%, silt = 43%, and clay = 15%. A soil test of this plot taken on 2 May 2000 from samples no deeper than 6 inches from the crown/thatch layer, showed that: pH = 6.0; CEC = 9.1 meq/100 g; OM = 2.16%; Olsen-P = 23.1 ppm; exchangeable K = 117 ppm; exchangeable Ca = 1583 ppm; exchangeable Mg = 158 ppm; exchangeable Na = 69 ppm. The study area (18 × 24 ft; 5.5 × 7.3 m) was located in an area of highest irrigation uniformity (DU = 83%) within the larger plot area. Individual plot size was 4.5 × 6.0 ft (1.4 × 1.8 m) (Fig. 1).

Experimental Design

Randomized complete block (RCB) design with four replications. Analysis of variance (ANOVA) was performed for turfgrass visual ratings at each rating date. Fisher's Protected least-significant- difference (LSD) test was used for means separations. Overall ANOVA was a repeated measures design with fertilizer product treatments as the main plot factor and rating date as the repeated measures factor.

Mowing

Two times per week with a walk-behind [7-blade, 24-inch (61-cm)] reel mower set at a 5/8-inch (1.6-cm) mowing height. Clippings were not collected.

Irrigation

Plot was irrigated to prevent visual drought symptoms and over watering.

Nitrogen Fertilizer Treatments ($N-P_2O_5-K_2O$)

1. TRI-Pro (23–5–12)
2. Best Poly Supreme (23–5–10)
3. Best Turf Supreme (16–6–8)
4. Scotts Super Turf (25–4–12)
5. UHS Signature (30-3-10)

- All nitrogen fertilizer treatments were applied at a rate of 1.5 lb/1000 ft^2 (73.2 $kg \cdot ha^{-1}$) N per application.
- First application on 3 May 2000.
  Second application on 31 July 2000.
- Nitrogen fertilizer treatments were applied by hand in three different directions using an "application box" which prevented contamination of adjacent plots. All products were mixed uniformly with an equivalent amount of #20 silica sand to aid with uniform application.

Measurements

1. Visual turfgrass quality ratings were taken every 2 weeks beginning 19 May (2 weeks after the initial treatment application) using a 1 to 9 scale with 1 = poorest and 9 = best common bermudagrass. A rating of 5 constituted minimally acceptable visual turfgrass quality.

2. Visual turfgrass color ratings were taken concurrent to visual turfgrass quality ratings using a 1 to 9 scale with 1 = brown and 9 = darkest green color for common bermudagrass. A rating of 5 constituted minimally acceptable visual turfgrass color.

The last visual turfgrass quality and color ratings were taken on 7 Oct. 2000.

Note that beginning 16 June 2000, the study area was groomed with a Toro 20-inch (51-cm) rotary mower set at 1 inch (2.54 cm) to vacuum clippings prior to ratings. This served to remove dead clippings which could bias visual ratings.

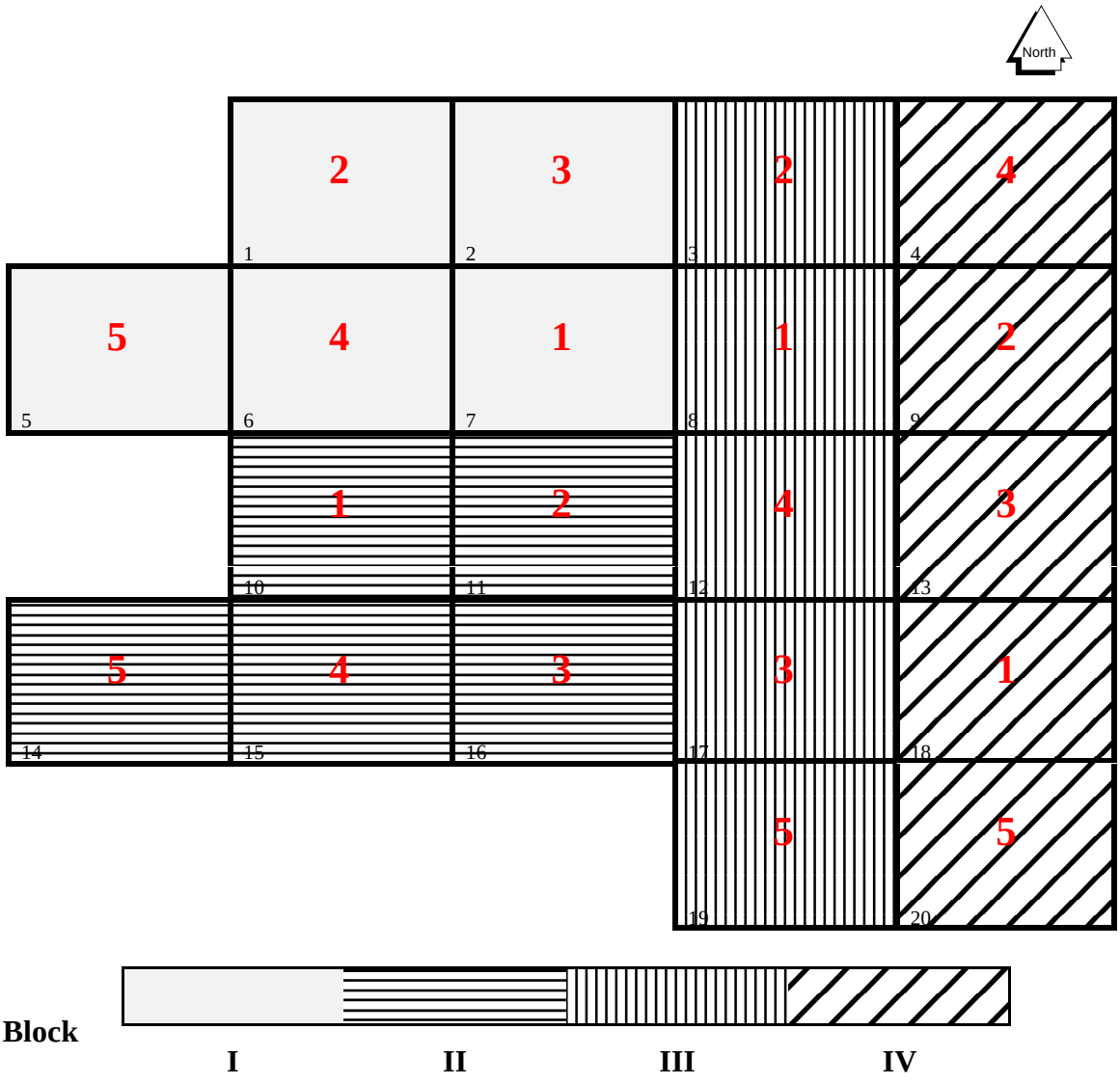
Results

Four slow-release fertilizers were evaluated from 19 May through 7 Oct. 2000 on Arizona common bermudagrass (plot seeded May 1999). A fifth product, Best Turf Supreme (16-6-8), served as a standard fast-release nitrogen fertilizer treatment. All fertilizer products were applied twice – first on 3 May, and secondly on 31 July 2000 – at a rate of 1.5 lb/1000 ft^2 (73.2 $kg \cdot ha^{-1}$) N per application. Visual turfgrass quality and visual turfgrass color ratings began 2 weeks after the initial fertilizer application (19 May), and continued once per 2 weeks until the end of the study. Please note that the visual turfgrass quality and color scales (described in "Measurements" above) were based upon quality and color for common bermudagrass, not hybrid bermudagrass. A rating of 5 was considered minimally acceptable, fairway-quality common bermudagrass.

Overall visual turfgrass quality ratings ranged from 6.2 for Scotts Super Turf to 6.4 for Tri-Pro (Table 2). These quality ratings represent a more-than acceptable common bermudagrass fairway. Basically, there were no significant differences among the nitrogen fertilizer treatments (exception, 19 May).

Overall visual turfgrass color ratings ranged from 6.2 for Best Turf Supreme, Tri-Pro, Scotts Super Turf and Best Poly Supreme to 6.3 for UHS Signature (Table 3). These color ratings represent a more-than acceptable common bermudagrass fairway. Generally, there were no significant differences among the nitrogen fertilizer treatments (exception, 19 May, 22 Sept. and 7 Oct.) (Table 3 and Fig. 2).

Figure 1. Plot map for the evaluation of slow-release nitrogen products applied on Arizona common bermudagrass during the summer season of 2000 in Riverside, Calif.



Nitrogen fertilizer treatments	Plots treated
1. TRI-Pro (23-5-12)	7,8,10,18
2. Best Poly Supreme (23-5-10)	1,3,9,11
3. Best Turf Supreme (16-6-8)	2,13,16,17
4. Scotts Super Turf (25-4-12)	4,6,12,15
5. UHS Signature (30-3-10)	5,14,19,20

Table 2. Visual turfgrass quality ratings (1 to 9 scale, with 1 = brown, 5 = minimally acceptable, and 9 = best) of Arizona common bermudagrass treated with five nitrogen fertilizers and maintained similar to fairway conditions.

Nitrogen fertilizer treatment (N-P_2O_5-K_2O)	Date (Weeks after treatment)[z]											
	19 May (2)	2 June (4)	16 June (6)	30 June (8)	14 July (10)	28 July (12)	11 Aug. (2)	25 Aug. (4)	6 Sept. (6)	22 Sept. (8)	7 Oct. (10)	Overall
Best Turf Supreme (16–6–8)	6.6 a[y]	6.8	6.8	6.2	5.9	5.6	6.4	6.3	6.2	6.1	5.8	6.3
TRI-Pro (23–5–12)	6.5 ab	6.5	6.6	6.4	6.1	5.6	6.7	6.7	6.4	6.4	6.1	6.4
UHS Signature (30-3-10)	6.2 abc	6.6	6.6	6.4	6.1	5.8	6.6	6.5	6.5	6.1	5.8	6.3
Scotts Super Turf (25–4–12)	6.0 bc	6.2	6.4	6.4	6.2	5.7	6.4	6.3	6.4	6.1	6.1	6.2
Best Poly Supreme (23–5–10)	5.9 c	6.4	6.6	6.2	6.1	5.7	6.7	6.7	6.4	6.4	6.1	6.3
LSD, P=0.05	0.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Summary of ANOVA effects[x]												
Nitrogen product (N)	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Date (D)												***
N × D												***

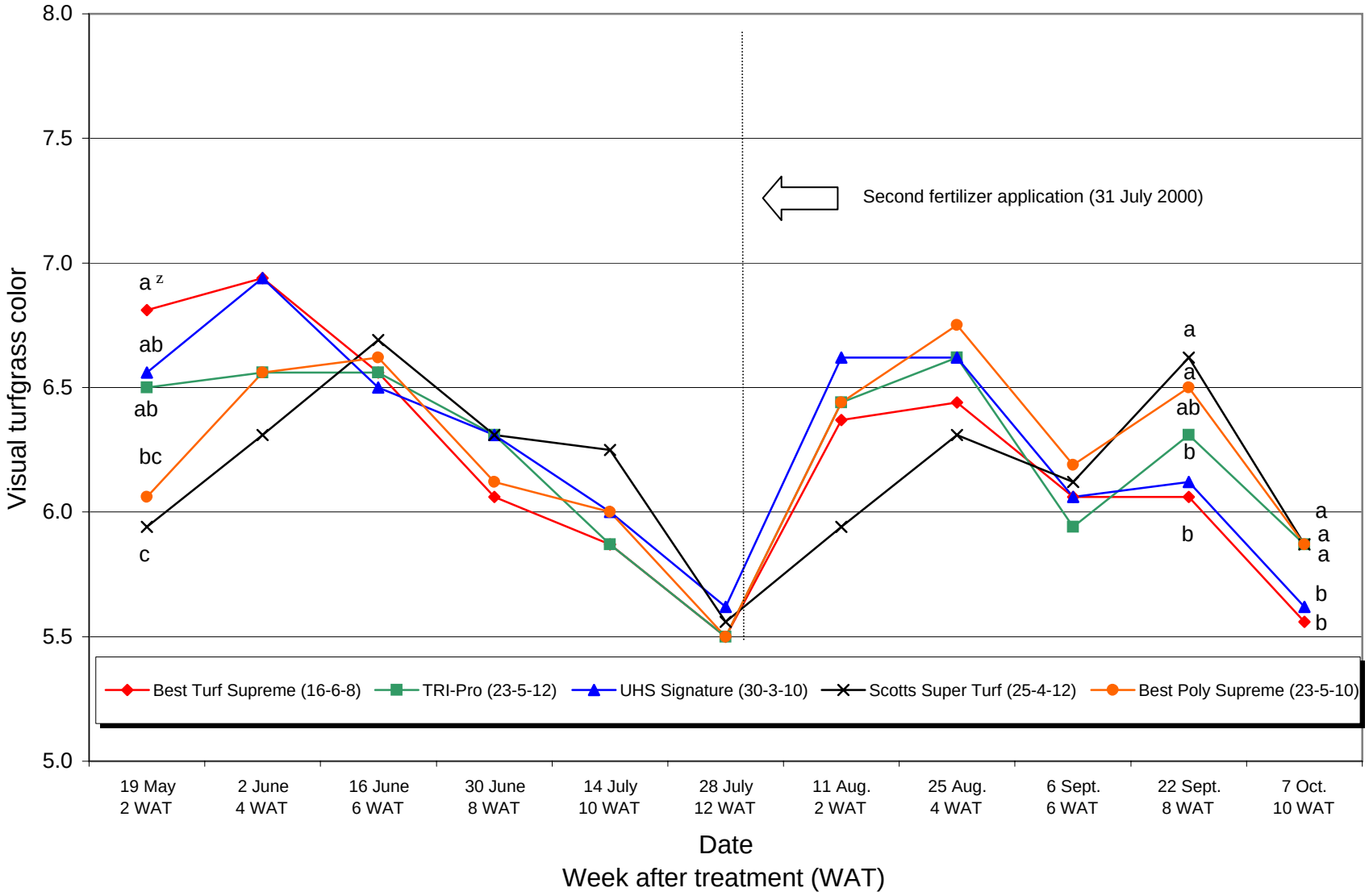
[z]First and second fertilizer applications on 3 May and 31 July 2000, respectively.
[y]Means followed by the same letter are not significantly different, Fisher's Protected least-significant-difference (LSD) test, P=0.05.
[x]Randomized complete block statistical effects by date and overall ANOVA with a repeated measures design.
NS,*,**,***Nonsignificant or significant at $P \leq 0.05$, 0.01, or 0.001, respectively.

Table 3. Visual turfgrass color ratings (1 to 9 scale, with 1 = brown, 5 = minimally acceptable, and 9 = darkest green) of Arizona common bermudagrass treated with five nitrogen fertilizers and maintained similar to fairway conditions.

	Date (Weeks after treatment)[z]											
Nitrogen fertilizer treatment (N-P_2O_5-K_2O)	19 May (2)	2 June (4)	16 June (6)	30 June (8)	14 July (10)	28 July (12)	11 Aug. (2)	25 Aug. (4)	6 Sept. (6)	22 Sept. (8)	7 Oct. (10)	Overall
Best Turf Supreme 16–6–8	6.8 a[y]	6.9	6.6	6.1	5.9	5.5	6.4	6.4	6.1	6.1 b	5.6 b	6.2
TRI-Pro 23–5–12	6.5 ab	6.6	6.6	6.3	5.9	5.5	6.4	6.6	5.9	6.3 ab	5.9 a	6.2
UHS Signature 30-3-10	6.6 ab	6.9	6.5	6.3	6.0	5.6	6.6	6.6	6.1	6.1 b	5.6 b	6.3
Scotts Super Turf 25–4–12	5.9 c	6.3	6.7	6.3	6.2	5.6	5.9	6.3	6.1	6.6 a	5.9 a	6.2
Best Poly Supreme 23–5–10	6.1 bc	6.6	6.6	6.1	6.0	5.5	6.4	6.7	6.2	6.5 a	5.9 a	6.2
LSD, P=0.05	0.5	NS	NS	NS	NS	NS	NS	NS	NS	0.3	0.2	NS
Summary of ANOVA effects[x]												
Nitrogen product (N)	*	NS	NS	NS	NS	NS	NS	NS	NS	**	*	NS
Date (D)												***
N × D												***

[z]First and second fertilizer applications on 3 May and 31 July 2000, respectively.
[y]Means followed by the same letter are not significantly different, Fisher's Protected least-significant-difference (LSD) test, P=0.05.
[x]Randomized complete block statistical effects by date and overall ANOVA with a repeated measures design.
NS,*,**,***Nonsignificant or significant at $P \leq 0.05$, 0.01, or 0.001, respectively.

Figure 2. Visual turfgrass color ratings (1 to 9 scale, with 1= brown, 5=minimally acceptable, and 9=darkest green) of Arizona common bermudagrass treated with five nitrogen fertilizers and maintained under fairway conditions



[z]Means followed by the same letter are not significantly different, Fisher's Protected least-significant-difference (LSD) test, $P=0.05$.