Grain Processing Corporation Nitrogen Fertilizer Field Study on Tall Fescue in Riverside, California

Final Report

SUBMITTED BY:

Kathie Carter
Grant Klein
Robert Green

SPONSORED BY:

Grain Processing Corporation

and

University of California, Riverside

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Objective: To evaluate nine quickly-available and slowly-available nitrogen (N) fertilizers by making applications each at a N rate of 0.8 lb/1000 ft^2 on a mature stand of tall fescue. The evaluations are visual turfgrass quality and color ratings.

Cultivar: Bonsai tall fescue (*Festuca arundinacea*)

Experimental site: A plot established on 28 Sept. 1993 at the UCR Turfgrass Field Research Facility, Riverside, California. The native soil is classified as a Hanford fine sandy loam. Results from a soil test[z] taken on 1 Mar. 2006 showed the following: pH = 6.9; Olsen-P = 44.3 ppm (sufficient); exchangeable K = 121.5 ppm (sufficient); cation exchange capacity (CEC) = 13.0 meq/100 g dry soil (sufficient); organic mater (OM) = 2.29% by weight (sufficient). Also, a soil test taken during April 1997 showed that the particle size analysis was 51% sand, 38% silt, and 11% clay (soil textural classification = loam).

Experimental design: Randomized complete block design with four replications (Fig. 1). Individual plot size was 4.5 x 6.0 ft.

Mowing: The plot was mowed once per week with a 68-inch rotary riding mower. During the cool season (approximately 10 Oct. to 15 June), the mowing height was set at 1.75 inch and during the warm season the mowing height was set at 2.25 inch.

Irrigation: The plot was irrigated to prevent visual drought symptoms and over watering.

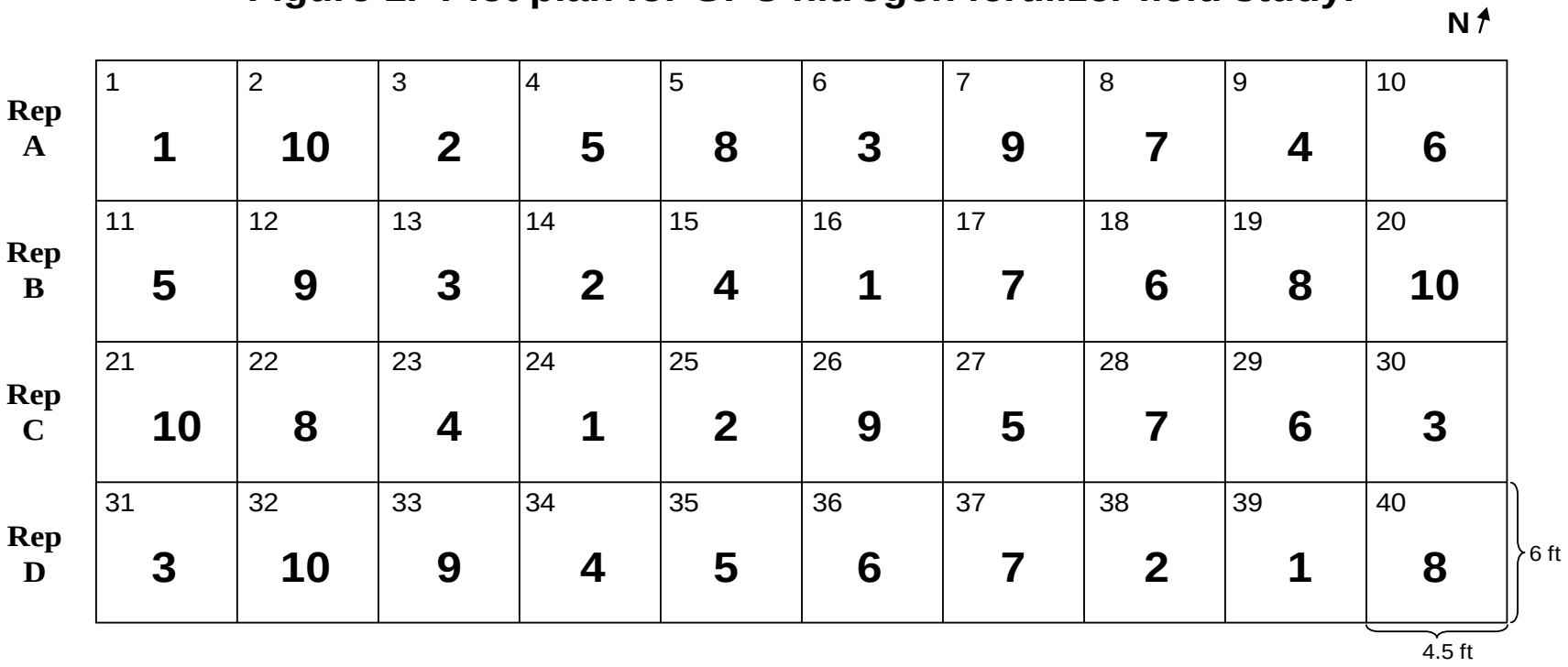
Treatments: Nine N fertilizer products were applied on 5 July and 19 Sept. 2007 at a N rate of 0.8 lb/1000 ft^2 (Table 1). Treatments also included a no-fertilizer control (check). All fertilizer treatments were uniformly applied by hand spreading and immediately watered in.

Measurements: Visual turfgrass quality and color ratings were simultaneously taken once every 2 weeks for 19 weeks following initial treatment applications. The first rating date was 18 July and the last rating date was 7 November. A 1 to 9 scale was used for quality (1 = worst, 5 = minimally acceptable, and 9 = best tall fescue) and color (1 = brown, 5 = minimally acceptable, and 9 = darkest green tall fescue).

Results: Visual turfgrass quality ratings are shown in Fig. 2 and Table 2 and visual turfgrass color ratings are shown in Fig. 3 and Table 3. The 10 treatments (9 fertilizer product treatments and 1 check treatment) were not significantly different for visual turfgrass quality or color on all rating dates. During the 19 weeks of the study, all treatments, including the check, resulted in acceptable tall fescue quality and color. Considering the relatively high visual turfgrass quality and color of the check treatment, it is fair to reason that the N status of the plot was good before and during the study which minimized the effect of the additional N from the nine N fertilizer product treatments.

[z]DANR Analytical Laboratory soil analysis methods: pH = saturated paste (s.p.), pH meter; Olsen-P = alkaline extraction (ext.) by 0.5 Normal $NaHCO_3$ for soils with pH > 6.5 by ascorbic acid reduction of phosphomolybdate complex and measured by spectrophotometry; exchangeable K, Na, Ca, and Mg = equilibrium ext. using 1 normal ammonium acetate (pH 7.0), subsequent determination by atomic absorption/emission spectrophotometry; Fe = equilibrium ext. using DTPA, subsequent determination by atomic absorption spectrometry; soluble (sol.) Ca and Mg = s.p. ext., inductively coupled plasmic atomic emission spectrometry; sol. Na and K = s.p. ext., emission spectrometry; HCO_3 and CO_3 = s.p. ext., titration with 0.05 normal H_2SO_4 acid; SAR = estimated calculation from Ca, Mg, and Na on s.p. ext.; CEC = barium acetate saturation and calcium replacement; OM = potassium dichromate reduction of organic carbon and subsequent spectrophotometric measurement; EC_e = semi-quantifies the amount of soluble salts in the saturation paste extract using conductivity meter; particle size analysis of sand, silt and clay determined by soil suspension by hydrometer.

Figure 1. Plot plan for GPC nitrogen fertilizer field study.



Treatments

1. Gro-Well 15-0-4
2. Gro-Well 12-0-6
3. Gro-Well 9-0-0
4. Cockadoodle DOO 4-3-3
5. Scott's Turf Builder 29-3-4 2% Fe
6. Milorganite 6-2-0 4% Fe
7. Nature Safe 10-2-8
8. Nature Safe 21-3-7
9. Turf Supreme 16-6-8
10. Check

Table 1. Treatments for the GPC nitrogen fertilizer field study.

Treatment		Analysis (N-P_2O_5-K_2O)	N source(s)	
			Quickly available	Slowly available
1.	Gro-Well	15-0-4	0.20% water soluble 7.0% urea	7.8% water insoluble
2.	Gro-Well	12-0-6	0.20% water soluble 4.0% urea	7.8% water insoluble
3.	Gro-Well	9-0-0	0.77% water soluble	8.23% water insoluble
4.	Cockadoodle DOO	4-3-3	0.73% water soluble	3.27% water insoluble
5.	Scotts Turf Builder Lawn Fertilizer	29-3-4 with 2% iron	6.6% ammoniacal 12.3% urea 2.5% water soluble	6.8% water soluble 0.8% water insoluble
6.	Milorganite	6-2-0 with 4% iron	0.75% water soluble	5.25 % water insoluble
7.	Nature Safe	10-2-8	0.25% ammoniacal 0.75 % water soluble	9.0% water insoluble
8.	Nature Safe	21-3-7 blended with UFLEXX	0.01 % ammoniacal 0.69% water soluble 18.20% urea	2.1 % water insoluble
9.	Turf Supreme	16-6-8	16% ammoniacal	
10.	Check	–	–	

Figure 2. Visual turfgrass quality ratings (1 to 9 scale, with 1=worst, 5=minimally acceptable, and 9=best tall fescue) of nine fertilizer product treatments applied to tall fescue in Riverside, Calif.

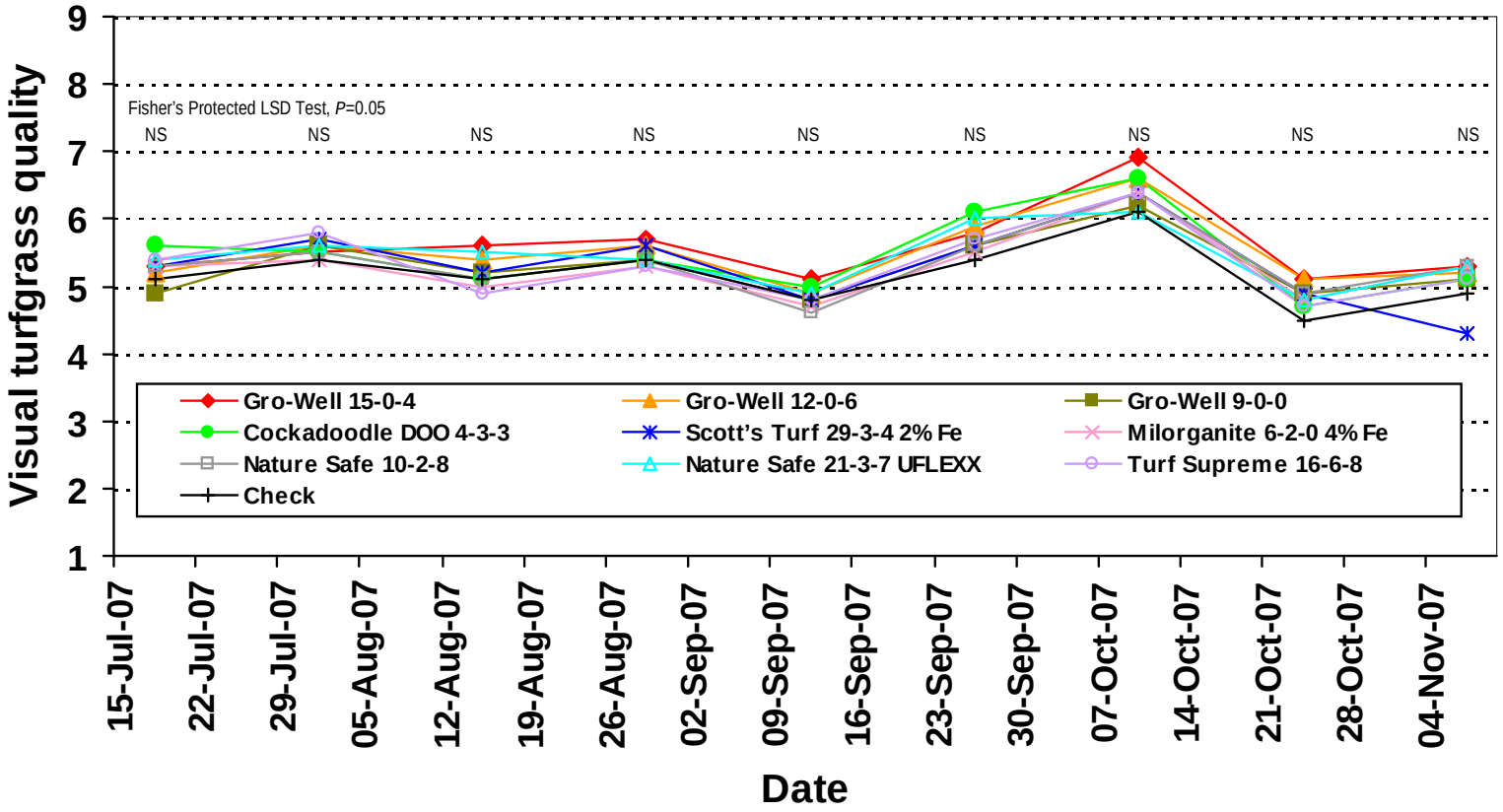


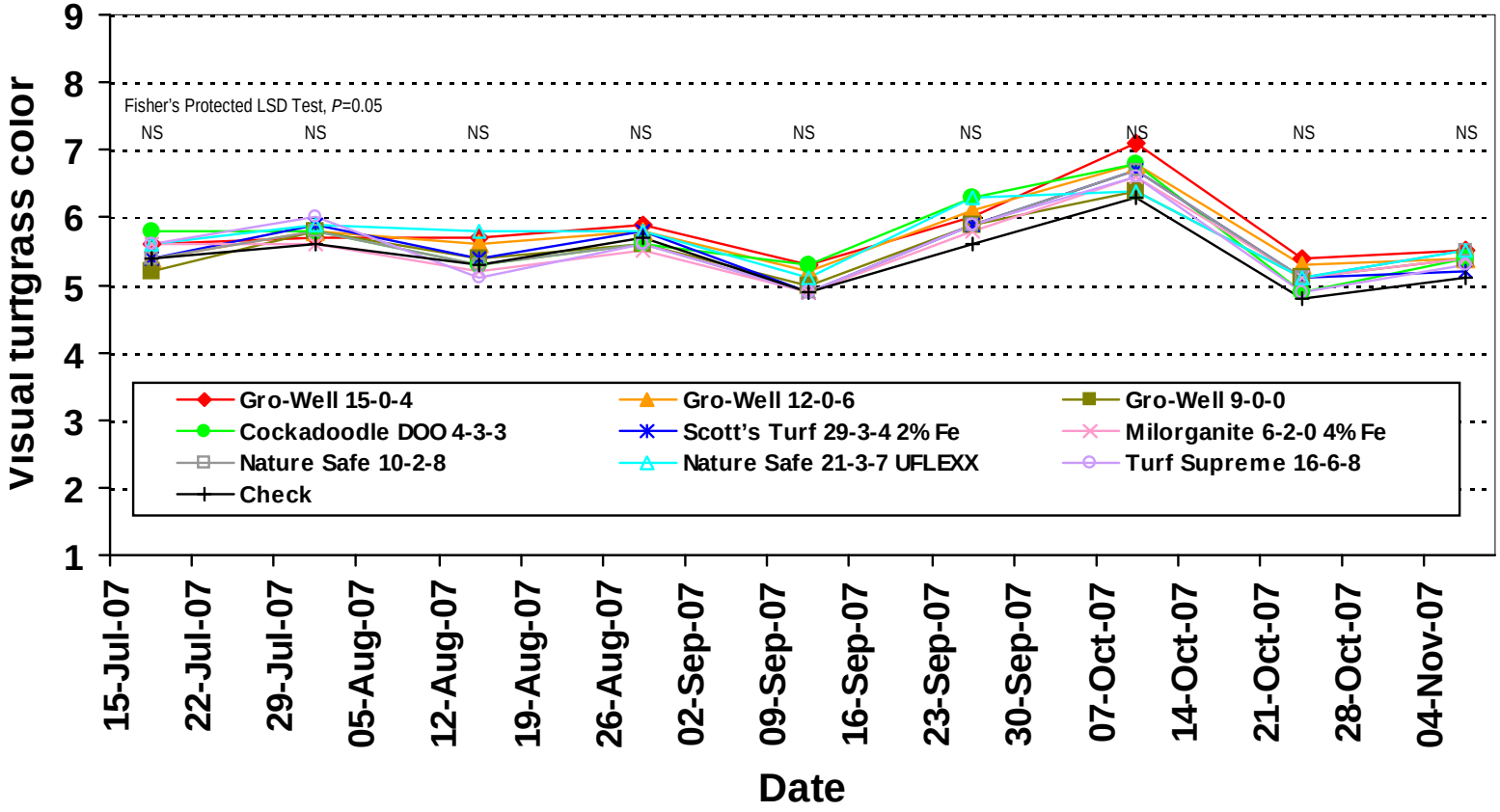
Table 2. Visual turfgrass quality ratings (1 to 9 scale, with 1=worst, 5=minimally acceptable, and 9=best tall fescue) of nine fertilizer product treatments applied to tall fescue in Riverside, Calif.

Treatment[z]	18 July 2007	1 Aug. 2007	15 Aug. 2007	29 Aug. 2007	12 Sept. 2007	26 Sept. 2007	10 Oct. 2007	24 Oct. 2007	7 Nov. 2007
Gro-Well 15-0-4	5.3	5.5	5.6	5.7	5.1	5.8	6.9	5.1	5.3
Gro-Well 12-0-6	5.2	5.6	5.4	5.6	4.9	5.9	6.6	5.1	5.2
Gro-Well 9-0-0	4.9	5.6	5.2	5.4	4.8	5.6	6.2	4.9	5.1
Cockadoodle DOO 4-3-3	5.6	5.5	5.1	5.4	5.0	6.1	6.6	4.7	5.1
Scott's Turf Builder Lawn Fertilizer 29-3-4 2% Iron	5.3	5.7	5.2	5.6	4.8	5.6	6.4	4.9	4.3
Milorganite 6-2-0 4% Iron	5.3	5.4	5.0	5.3	4.7	5.5	6.4	4.8	5.3
Nature Safe 10-2-8	5.3	5.5	5.1	5.4	4.6	5.6	6.4	4.9	5.3
Nature Safe 21-3-7 blended with UFLEXX	5.4	5.6	5.5	5.4	4.9	6.0	6.1	4.8	5.3
Turf Supreme 16-6-8	5.4	5.8	4.9	5.3	4.8	5.7	6.4	4.7	5.1
Check	5.1	5.4	5.1	5.4	4.8	5.4	6.1	4.5	4.9
LSD, P=0.05[y]	NS	NS	NS	NS	NS	NS	NS	NS	NS
ANOVA effect (P)									
Treatment	0.4205	0.8504	0.1100	0.1869	0.1156	0.1843	0.3082	0.1003	0.1084

[z] All N fertilizer product treatments applied on 5 July and 19 Sept. 2007 at a N rate of 0.8 lb/1000 ft^2.

[y] Mean separation within columns by Fisher's protected LSD test, P=0.05.

Figure 3. Visual turfgrass color ratings (1 to 9 scale, with 1=brown, 5=minimally acceptable, and 9=darkest green tall fescue) for nine fertilizer product treatments applied to tall fescue in Riverside, Calif.



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Gro-Well 9-0-0	5.2	5.8	5.4	5.6	5.0	5.9	6.4	5.1	5.4
Cockadoodle DOO 4-3-3	5.8	5.8	5.3	5.6	5.3	6.3	6.8	4.9	5.4
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Turf Supreme 16-6-8	5.6	6.0	5.1	5.6	4.9	5.9	6.6	4.9	5.3
Check	5.4	5.6	5.3	5.7	4.9	5.6	6.3	4.8	5.1
LSD, P=0.05[y]	NS	NS	NS	NS	NS	NS	NS	NS	NS
ANOVA effect (P)									
Treatment	0.4213	0.8466	0.1746	0.1680	0.0717	0.2244	0.3103	0.1003	0.1438

[z] All N fertilizer product treatments applied on 5 July and 19 Sept. 2007 at a N rate of 0.8 lb/1000 ft^2.

[y] Mean separation within columns by Fisher's protected LSD test, P=0.05.