Grain Processing Corporation 2007 Qualitative Evaluation – P15 Soil Amendment Study

Final Report

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Table 1. Materials and methods outline for the Grain Processing Corporation 2007 qualitative evaluation – P15 soil amendment study.

Objectives: To evaluate the effect of P15 soil amendment on visual turfgrass quality and color and clipping yield of tall fescue maintained under well-watered and well-fertilized conditions.

Cultivar: Crossfire 2 tall fescue (*Festuca arundinacea*).

Experimental site: A plot established in March 2002 at the UCR Turfgrass Field Research Facility, Riverside, Calif. The root zone is a native soil which is classified as a Hanford fine sandy loam. Results from a soil test[z] taken on 14 Sept. 2005 showed the following: pH = 7.3; Olsen-P = 6.3 ppm (low); exchangeable K = 98 ppm (sufficient); cation exchange capacity (CEC) = 14.8 meq/100g dry soil (sufficient); and organic mater (OM) = 1.23% by weight (low to sufficient). Based on soil tests taken from 1996 to 2003, the average particle size analysis has been: sand = 52%; silt = 36%; and clay = 12% (soil textural classification = loam).

Prior fertilization. During 2006, The plot was fertilized at an annual nitrogen (N) rate of 4.0 lb/1000 ft^2 with a Scotts Turf Builder Lawn fertilizer with 2% Iron (29-3-4). The annual N rate was divided into five individual fertilizer applications.

Experimental design: Randomized complete block design with four replications. Plots assigned to the four blocks (replications) based on the amount of water collected from each plot as part of an irrigation catch-can test prior to the 2006 study. This resulted in high, medium-high, medium-low and low irrigation volume blocks (replications). The same treatments were applied to the same plots for the 2006 and 2007 studies. Individual plot size was 7.0 x 10.0 ft. (Fig. 1).

Mowing: The plot was mowed once per week with a 21-inch walk-behind rotary mower. The mowing height was set at 2.0 inches. Clippings were collected.

Irrigation: Irrigation regime was set to 110% previous 7-day cumulative real-time reference evapotranspiration (ET_o), as reported by the California Irrigation Management Information Service (CIMIS). This regime involved rescheduling the irrigation controller once every 7 days.

Fertilization: Scotts Turf Builder Lawn fertilizer with 2% Iron (29-3-4) was applied uniformly over the plot with a drop-type spreader at an N rate of 1.0 lb/1000 ft^2 on 21 June, 23 Aug., and 25 Oct., for an annual N rate of 3.0 lb/1000 ft^2.

Treatments: P15 was applied on 21 June at 30 and 15 lb/1000 ft^2; the third treatment was a no-product control (check). The P15 was applied as a topdressing and thoroughly watered in. During the 2006 study, the same plots received three individual applications of the same treatments on 8 Mar., 30 Mar., and 30 Aug., 2006.

Measurements: Visual ratings of turfgrass quality and color were simultaneously taken once every 2 weeks. Also, clipping yields were taken once every 2 weeks. Clipping yields were the result of 7 days growth and are reported as g/m^2 per day. Visual ratings and clipping yields were taken on alternate weeks.

[z]DANR Analytical Lab. soil analysis methods: pH = saturated paste, pH meter; Olsen-P = alkaline extraction 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 = equilibrium extraction using 1 Normal ammonium acetate (pH 7.0), subsequent determination by atomic absorption/emission spectrophotometry; CEC = barium acetate saturation and calcium replacement; OM = potassium dichromate reduction of organic carbon and subsequent spectrophotometric measurement; particle size analysis of sand, silt and clay determined by soil suspension by hydrometer.

Results

Visual turfgrass quality and color

Visual turfgrass quality and color ratings are shown in Tables 2 and 3, respectively. Only on 27 September were there significant differences among treatments for visual turfgrass quality and color. Visual turfgrass quality and color were in the “acceptable” range during the study.

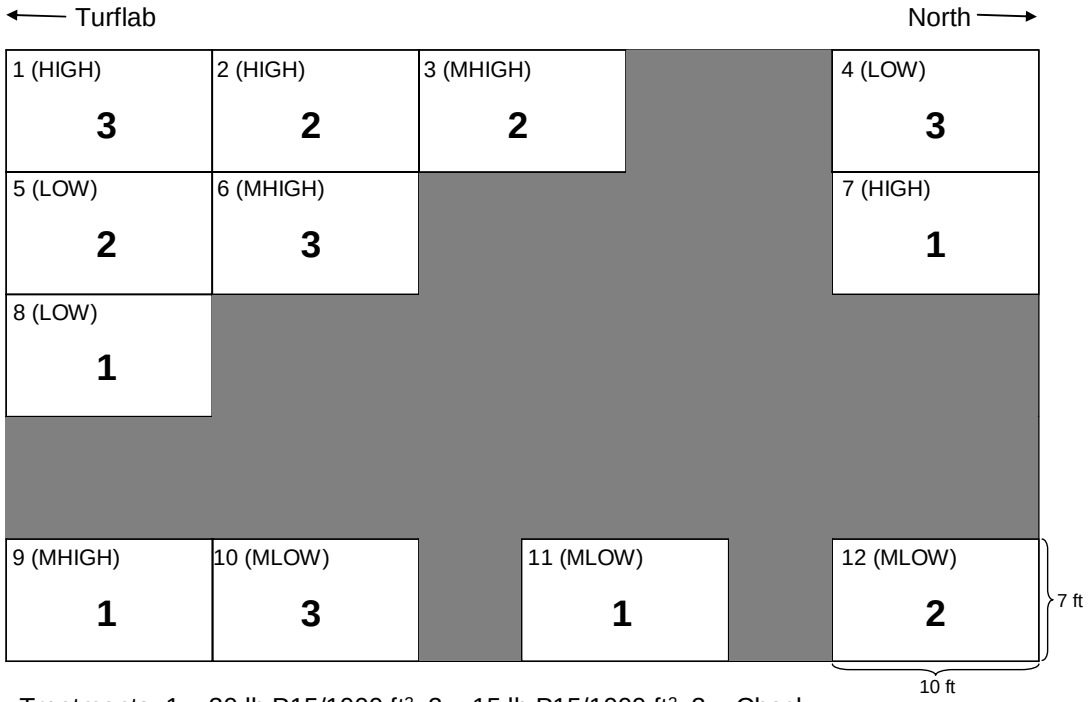
Clipping yield

Average daily clipping yield data are shown in Table 4. On all collection dates there were no significant differences among treatments for clipping yield.

Recommendation

Based on the results of this study, more P15 should be applied to affect soil conditions. The recommended P15 application rates for newly seeded or sodded areas or spot treatments should be considered for established turfgrass. Additionally, recommended application rates and results may vary due to pre-amended soil conditions. Some of these conditions would include soil textural classification, organic matter content, cation exchange capacity, porosity (total, macro, and capillary), and available water holding capacity.

Figure 1. Plot plan for the Grain Processing Corporation 2007 qualitative evaluation – P15 soil amendment study.



Treatments: 1 = 30 lb P15/1000 ft^2; 2 = 15 lb P15/1000 ft^2; 3 = Check

Note: The same treatments were applied to the same plots for the 2006 and 2007 studies.
Note: Treatments assigned to four blocks, designated HIGH, MHIGH, MLOW, and LOW.

Table 1. Calendar of major activities.

Date	Activity
19 June 2007	Irrigation regime set to 110% previous 7-day cumulative real-time ET_o. This regime involved rescheduling the irrigation controller every 7 days.
20 June 2007	Mowing regime set to once per week at a 2-inch mowing height.
21 June 2007	P15 soil amendment application. Fertilizer application at an N rate of 1.0 lb/1000 ft^2.
3 July 2007	Initial visual ratings. Ratings subsequently taken once every 2 weeks.
11 July 2007	Initial clipping yields taken. Clipping yields subsequently taken once every 2 weeks.
23 Aug. 2007	Fertilizer application at an N rate of 1.0 lb/1000 ft^2.
25 Oct. 2007	Fertilizer application at an N rate of 1.0 lb/1000 ft^2.
31 Oct. 2007	Last clipping yields taken.
7 Nov. 2007	Last visual ratings taken.
9 Nov. 2007	End of study.

Table 2. The effect of P15 soil amendment on visual turfgrass quality ratings of tall fescue (1 to 9 scale, with 1=worst, 5=minimally acceptable, and 9=best tall fescue).

Rate of P15 application[z]	3 July 2007	18 July 2007	1 Aug. 2007	15 Aug. 2007	29 Aug. 2007	12 Sept. 2007	27 Sept. 2007	10 Oct. 2007	24 Oct. 2007	7 Nov. 2007
30 lb/1000 ft^2	6.1	6.0	5.6	5.8	7.1	6.2	6.1	6.8	6.0	6.2
15 lb/1000 ft^2	6.1	6.3	5.7	5.8	7.0	5.8	5.6	6.6	5.8	5.9
Check	5.9	6.1	5.3	5.3	6.7	5.8	5.1	6.6	5.8	6.2
LSD, P=0.05[y]	NS	NS	NS	NS	NS	NS	0.3224	NS	NS	NS
ANOVA effect (P)										
Treatment	0.8611	0.3302	0.6699	0.5040	0.8689	0.7209	0.0008	0.3554	0.7900	0.2529

[z] P15 applied as a topdressing and watered in on 21 June 2007. Nitrogen fertilizer applications of Scotts Turf Builder Lawn fertilizer with 2% Iron (29-3-4) were made on 21 June, 23 Aug., and 25 Oct. 2007. The rate of nitrogen applied was 1.0 lb/1000 ft^2.

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

Table 3. The effect of P15 soil amendment on visual turfgrass color ratings of tall fescue (1 to 9 scale, with 1=brown, 5=minimally acceptable, and 9=darkest green tall fescue).

Rate of P15 application[z]	3 July 2007	18 July 2007	1 Aug. 2007	15 Aug. 2007	29 Aug. 2007	12 Sept. 2007	27 Sept. 2007	10 Oct. 2007	24 Oct. 2007	7 Nov. 2007
30 lb/1000 ft^2	6.1	6.0	5.6	5.8	7.1	6.2	6.1	6.8	6.0	6.2
15 lb/1000 ft^2	6.1	6.3	5.7	5.8	7.0	5.8	5.6	6.6	5.8	5.9
Check	5.9	6.1	5.3	5.3	6.7	5.8	5.1	6.6	5.8	6.2
LSD, P=0.05[y]	NS	NS	NS	NS	NS	NS	0.3224	NS	NS	NS
ANOVA effect (P)										
Treatment	0.8611	0.3302	0.6699	0.5040	0.8689	0.7209	0.0008	0.3554	0.7900	0.2529

[z] P15 applied as a topdressing and watered in on 21 June 2007. Nitrogen fertilizer applications of Scotts Turf Builder Lawn fertilizer with 2% Iron (29-3-4) were made on 21 June, 23 Aug., and 25 Oct. 2007. The rate of nitrogen applied was 1.0 lb/1000 ft^2.

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

Table 4. The effect of P15 soil amendment on clipping yields of tall fescue.

Rate of P15 application[z]	11 July 2007	25 July 2007	1 Aug. 2007	22 Aug. 2007	5 Sept. 2007	19 Sept. 2007	4 Oct. 2007	17 Oct. 2007	31 Oct. 2007
				- - *g/m²* per day - -					
30 lb/1000 ft²	0.84	0.64	0.64	0.51	0.65	0.72	0.71	0.36	0.32
15 lb/1000 ft²	0.83	0.49	0.66	0.54	0.66	0.69	0.63	0.28	0.21
Checkl	0.71	0.60	0.58	0.57	0.71	0.69	0.73	0.32	0.28
LSD, *P*=0.05[y]	NS	NS	NS	NS	NS	NS	NS	NS	NS
ANOVA effect (*P*)									
Treatment	0.4806	0.2452	0.7413	0.6836	0.8616	0.5315	0.4890	0.1787	0.1248

[z]P15 applied as a topdressing and watered in on 21 June 2007. Nitrogen fertilizer applications of Scotts Turf Builder Lawn fertilizer with 2% Iron (29-3-4) were made on 21 June, 23 Aug., and 25 Oct. 2007. The rate of nitrogen applied was 1.0 lb/1000 ft².

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