Efficacy of experimental plant growth regulator on biomass growth reduction and crop tolerance in Kentucky bluegrass sod mixtures - 2010 trial.

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The objective of this research project was:

1. to evaluate experimental PGR for reduction grass biomass reduction and compare with an industry standard PGR in Kentucky bluegrass sod mixtures (40 mm mowing height)

2. to determine appropriate rate for experimental PGR competitive to the industry standard rate and evaluate crop safety on turf

Data collected included measurements of phytotoxicity 7 and 21 DAT, regular canopy reflectance data (NDVI and R/NIR indices) shoot dry matter accumulation to estimate grass biomass reduction (at mowing), turf quality, uniformity, and density, and resistance of the turf to disease and other stresses.

MATERIALS/METHODS

The trial involved established Kentucky bluegrass sod mix turf on sandy loam soil. Treatments consisted of the sponsor's product at several rates (Table 1) applied monthly beginning May 28, 2010. An untreated check as well as an industry standard treatment was also included. Treatments were applied to 1 x 3 m plots of turf maintained as appropriate on the sandy loam soil research ranges at the Guelph Turfgrass Institute (weekly mowing at 40 mm, regular fertility, irrigation to prevent stress). Treatments were replicated four times in a randomized complete block design. Treatments were applied in 5 applications (monthly May 28 - September 17). Treatments were applied with a compressed air sprayer (20 psi; 50 ml m-2 spray volume; TeeJet 8001VS flat fan nozzles). Plots were mowed as close as possible in time prior to application, but not closer than 1hour before application. Regular mowing frequencies between applications were roughly weekly for the 40 mm height of cut.

Color response and general vigor of the turf was assessed, both visually and using canopy reflectance (chlorophyll meter, Greenseeker NDVI and R/NIR). Uniformity of the color response was assessed visually. Plots were rated for turf quality, density and uniformity. Clippings were collected from a fixed area (1.1 m2) of each plot from regular mowings to determine shoot growth rates. Clippings were collected on every mowing date, for a total of 16 collections. An anecdotal photographic record of the experiment was kept.

All measurements were analyzed by appropriate statistical analyses (general linear models).

RESULTS

Table 1. Treatments

Treatment	Product	Product rate (mL 100 m^{-2})	Application volume
1	Untreated	—	—
2	LI6279	3.85	500 L ha^{-1}
3	LI6279	7.7	500 L ha^{-1}
4	LI6279	11.5	500 L ha^{-1}
5	LI6279	15.4	500 L ha^{-1}
6	LI6314	7.7	500 L ha^{-1}

All products applied monthly: May 28, June 25, July 22, August 20, and September 17, 2010.

Figure 1. Plot area in Kentucky bluegrass turf on soil range, August 18, 2009.

Canopy reflectance and turf performance. There significant differences among treatments in canopy reflectance on all but one measurement date (Table 2). The absolute values of the NDVI differences, whether positive or negative, were too small to be significant to management (there were no differences in turf color or quality visible to a trained visual rater). Previous trials have shown a positive association between canopy reflectance and growth rate, but the absolute differences in NDVI are small.

Table 2. Canopy reflectance of treated plots.

Treatment	05/25	05/27	05/29	05/31	06/01	06/04	06/05	06/10	06/08	06/14	06/16	06/28	07/02	07/06
				1 DAT	3	4	7	8	11	14	17	19	3 DAT	11
LI6279 3.85	0.424[1]	0.392	0.409	0.469	0.375	0.411	0.364	0.428	0.413	0.449	0.420	0.484	0.397	0.355
LI6279 7.7	0.381	0.368	0.380	0.436	0.316	0.337	0.298	0.346	0.345	0.369	0.357	0.423	0.372	0.309
LI6279 11.5	0.363	0.336	0.359	0.417	0.300	0.326	0.287	0.364	0.346	0.371	0.363	0.428	0.377	0.300
LI6279 15.4	0.385	0.359	0.379	0.426	0.327	0.369	0.326	0.397	0.374	0.413	0.392	0.462	0.380	0.342
LI6314 7.7	0.460	0.425	0.449	0.473	0.388	0.418	0.372	0.430	0.403	0.449	0.436	0.481	0.372	0.327
Untreated	0.412	0.390	0.406	0.461	0.347	0.376	0.336	0.381	0.384	0.402	0.381	0.440	0.359	0.306
LI6279 3.85	0.012[2]	0.002	0.003	0.009	0.028	0.034	0.028	0.046	0.029	0.047	0.039	0.045	0.038	0.049
LI6279 7.7	-0.031	-0.022	-0.026	-0.025	-0.031	-0.040	-0.038	-0.035	-0.039	-0.033	-0.024	-0.017	0.013	0.003
LI6279 11.5	-0.049	-0.054	-0.047	-0.044	-0.047	-0.050	-0.049	-0.017	-0.038	-0.031	-0.017	-0.012	0.017	-0.006
LI6279 15.4	-0.027	-0.031	-0.027	-0.035	-0.020	-0.007	-0.010	0.016	-0.010	0.011	0.011	0.022	0.020	0.036
LI6314 7.7	0.047	0.035	0.044	0.012	0.041	0.042	0.037	0.049	0.019	0.047	0.056	0.042	0.013	0.021
msd p=0.05	0.018	0.017	0.016	0.019	0.016	0.014	0.017	0.015	0.015	0.014	0.012	0.01	0.014	0.011

Treatment	07/12	07/14	07/19	07/23	07/27	08/03	08/09	08/19	08/26	09/14	09/18	09/23	09/27
	17	19	24	1 DAT	5	12	18	28	6 DAT	25	1 DAT	6	10
LI6279 3.85	0.459	0.462	0.548	0.575	0.584	0.652	0.657	0.606	0.609	0.595	0.598	0.551	0.545
LI6279 7.7	0.418	0.419	0.509	0.535	0.550	0.632	0.638	0.607	0.617	0.599	0.595	0.563	0.550
LI6279 11.5	0.408	0.421	0.503	0.547	0.553	0.626	0.632	0.608	0.612	0.588	0.593	0.546	0.532
LI6279 15.4	0.436	0.424	0.507	0.553	0.555	0.633	0.628	0.598	0.603	0.586	0.586	0.551	0.546
LI6314 7.7	0.417	0.425	0.512	0.587	0.573	0.638	0.638	0.608	0.598	0.583	0.589	0.554	0.542
Untreated	0.404	0.406	0.487	0.535	0.553	0.637	0.631	0.593	0.603	0.584	0.593	0.554	0.546
LI6279 3.85	0.055	0.056	0.062	0.040	0.031	0.015	0.026	0.012	0.006	0.011	0.005	-0.003	-0.001
LI6279 7.7	0.014	0.012	0.022	0.000	-0.003	-0.005	0.008	0.013	0.014	0.015	0.002	0.009	0.004
LI6279 11.5	0.004	0.015	0.016	0.012	0.000	-0.011	0.001	0.015	0.009	0.004	-0.001	-0.008	-0.014
LI6279 15.4	0.032	0.018	0.021	0.018	0.002	-0.004	-0.003	0.005	0.000	0.002	-0.008	-0.003	0.000
LI6314 7.7	0.013	0.018	0.026	0.052	0.020	0.001	0.007	0.015	-0.005	-0.001	-0.004	0.000	-0.004
msd p=0.05	0.01	0.01	0.011	0.009	0.008	0.007	0.007	0.007	0.008	0.008	0.008	0.01	0.011

[1] Normalized-difference vegetation index; means of 40-50 readings x 4 replicates.

[2] Normalized-difference vegetation index relative to untreated control (=0); means of 40-50 readings x 4 replicates.

Growth rate. Shoot growth as estimated by measurements of shoot dry matter accumulation showed very little consistent change in growth in the plots associated with any treatment (Table 3.) One the one date when there was a significant difference, only the LI6314 growth regulator treatment was different from the untreated control.

DISCUSSION AND CONCLUSIONS

No growth regulator treatments produced a consistent reduction in shoot tissue growth relative to the untreated check, and in fact on many dates the growth rate in treated plots was greater than in the untreated control. This differs from the previous year, when there were some slight decreases in growth detected in some treatments. None of the treatments had a negative effect on turf color or quality (assessed by canopy reflectance and visually).

Table 3. Shoot growth rate; dry mass of clippings collected from bentgrass turf mowed at 37 mm every 3-7 days.

Treatment	06/03	06/11	06/21	06/30	08/09	08/27
	6 DAT	14 DAT	24 DAT	5 DAT	18 DAT	7 DAT
LI6279 3.85	8.08[1]	2.06	1.11	1.29	1.61 ab	3.75
LI6279 7.7	8.36	1.76	0.98	1.17	1.78 a	3.20
LI6279 11.5	5.47	1.71	0.95	1.01	1.51 ab	2.57
LI6279 15.4	7.85	2.00	1.05	1.19	1.44 ab	3.02
LI6314 7.7	8.15	1.59	1.04	1.16	0.71 c	2.37
Untreated	8.60	1.93	0.90	1.07	1.19 bc	2.94
LI6279 3.85	-0.53[2]	0.13	0.21	0.22	0.42	0.81
LI6279 7.7	-0.24	-0.16	0.08	0.10	0.59	0.25
LI6279 11.5	-3.13	-0.22	0.06	-0.06	0.32	-0.38
LI6279 15.4	-0.75	0.07	0.15	0.12	0.25	0.07
LI6314 7.7	-0.45	-0.33	0.14	0.08	-0.48	-0.57
msd p=0.05	NS	NS	NS	NS	0.56	NS

[1] Shoot growth rate (g m^{-2} day^{-1}) from tissue collected; means of 4 replicates.
[2] Shoot growth rate (g m^{-2} day^{-1}) relative to untreated control (=0); means of 4 replicates. Means within columns followed by the same letter are not significantly different (Fisher's protected lsd, p=0.05)

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