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Turfgrass Biostimulant Trial

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Abstract
A high shoot density provides a more uniform surface for ball roll on golf course putting greens, promotes a better golf ball lie on fairway-height turf, and impedes invasion from annual bluegrass, moss, and algae. In previous work at Iowa State University, an Ajinomoto USA, Inc. product resulted in consistently and significantly higher shoot densities when applied to a mature sod of Penncross creeping bentgrass.

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Turfgrass Biostimulant Trial

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Introduction

A high shoot density provides a more uniform surface for ball roll on golf course putting greens, promotes a better golf ball lie on fairway-height turf, and impedes invasion from annual bluegrass, moss, and algae. In previous work at Iowa State University, an Ajinomoto USA, Inc. product resulted in consistently and significantly higher shoot densities when applied to a mature sod of Penncross creeping bentgrass.

A natural fertilizer and biostimulant research trial was conducted for Ajinomoto USA, Inc. during the 2011 growing season that was a replication of a trial performed in 2010. The objective of this study was to determine the effect of biostimulant products upon growth and shoot density of Penncross creeping bentgrass.

Materials and Methods

Research was conducted at the ISU Horticulture Research Station on a Penncross creeping bentgrass fairway. The turf was mowed at 0.5 in. and established on a United States Golf Association (USGA) style sand-based rootzone. A randomized complete block design with 5 ft × 5 ft plots and three replications for each of the eight treatments (Table 1) was used. Treatments were applied to the same plots in 2011 as the 2010 trial to determine if there were any cumulative effects over the two-year period.

GreenNcrease, PanaSea plus, and Sample Product are biostimulants. A biostimulant is a broad term and refers to products that may contain one or more purported active ingredients. Ingredients can include cytokinians, humates, nutrients, organic acids, hormones, vitamins, microbial inoculants, plant extracts, and others. Often biostimulant products contain either iron (Fe), nitrogen (N), or both.

Treatments were applied to the same plots in 2011 as the 2010 trial to determine if there were any cumulative effects over the two-year period.

Treatment applications were made with a CO_2 powered backpack sprayer and a spray carrier volume of 3 gal/1,000 ft^2. Applications were made approximately every two weeks, and no watering was done for at least three hours after treatment application. Eight total applications were made. Data collected included shoot density, phytotoxicity, Normalized Difference Vegetation Index (NDVI), dry clipping yield, dollar spot ratings, drought tolerance, and total nitrogen analysis of the clipping tissue.

To ensure proper fertility, 0.3 lb nitrogen, 0.07 lb phosphorus, and 0.25 lb potassium/1,000 ft^2 was applied to the turf plots with an 18-9-18 granular fertilizer at the beginning of the trial. During the trial the plots received a foliar spray of urea (46-0-0) at a rate of 0.25 lb nitrogen/1,000 ft^2 every two weeks.

Results and Discussion

No significant differences were found among the treatments for NDVI, clipping yield or dollar spot. Treatment applications had little to no effect on color, clipping yield or dollar spot resistance. The 0.06 lb N/1,000 ft^2 rate of GreenNcrease and 0.012 lb N/1,000 ft^2 rate of Sample Product incurred the most damage due to drought stress, but the differences were not

significant. Research at another university indicates GreenNcrease may increase stress tolerance when applied to perennial ryegrass, however drought tolerance on Penncross creeping bentgrass was not evident in this trial. Further investigation into stress tolerance of GreenNcrease treated turf may be merited.

Phytotoxicity was observed on three occasions during the trial. The 0.12 lb N/1,000 ft^2 rate of GreenNcrease was the only treatment to have significant discoloration. When phytotoxicity appeared, it was usually 24–48 hours after treatments were applied and turf color returned to normal about a week later.

Shoot density counts were significantly different for three of the five collection dates (Table 2). Overall means calculated over the duration of the trial were also significant. The 0.06 lb N/1,000 ft^2 and 0.12 lb N/1,000 ft^2 rates of GreenNcrease had the highest shoot density overall means and were significantly different than all other treatments. Conversely, both rates of Sample Product had significantly lower shoot density overall means than all other treatments.

The data from this trial strongly supports the first year's results in that GreenNcrease treated plots at rates of 0.06 and 0.12 lb N/1,000 ft^2 resulted in higher shoot densities.

Table 1. Treatments and application rates for fertilizers and biostimulants to evaluate their effect on growth characteristics of Penncross creeping bentgrass.

Treatment	Product	Analysis	Rate
1	Untreated control	-	-
2	Urea - positive control	46-0-0	0.06 lb N/1,000 ft^2
3	PanaSeaPlus	0-2-2	3 oz product/1,000 ft^2
4	GreenNcrease	6-0-0	0.006 lb N/1,000 ft^2
5	GreenNcrease	6-0-0	0.06 lb N/1,000 ft^2
6	GreenNcrease	6-0-0	0.12 lb N/1,000 ft^2
7	Sample Product	1-0-0	0.003 lb N/1,000 ft^2
8	Sample Product	1-0-0	0.012 lb N/1,000 ft^2

Table 2. Influence of biostimulants on the shoot density of Penncross creeping bentgrass. Values are the means of three replications.

Treatment	June 28	July 27	Aug. 24	Sept. 22	Oct. 21	Mean
	----------shoots/in.^{2}----------					
1	236	226	244	280	301	257
2	222	237	261	285	290	259
3	214	239	261	264	279	251
4	240	242	259	277	283	260
5	251	241	268	296	321	275
6	223	245	270	294	318	270
7	219	228	232	269	267	243
8	221	211	227	264	281	241
$LSD_{(0.05)}$	19	NS	32	NS	45	13