



Soil Technologies Corp.
Research and Development Department

Research Report

Title: Effect of Biostimulant Products on Bermudagrass Grow In

Location: Mississippi State University

Principal Investigators: Dr. Barry Stewart and Jason Eberhard

Date: 2022

Crop: Bermuda Grass **Cultivar:** Bermuda “Sunday Ultra-Dwarf”

Abstract:

The purpose of this study was to evaluate the effect of biostimulant products, TurfTech Bio-Mega¹ and Bac-Pack², on Bermudagrass (Sunday Ultra-Dwarf). Each treatment was evaluated for percent cover, root mass, and soil enzyme activity. Plots used were built to USGA green specification and had been used for turf experiments in the past.

Methods:

There were nine treatments arranged in a randomized complete block design, with four replications of each treatment. All treatments received 1 lb. of nitrogen per 1000 ft² every two weeks from either fertilizer from 33-0-0 (Evergreen Ag) or from 18-9-18 (The Andersons) on a rotating basis.

Plots were analyzed using the Turf Analyzer Program which involved taking a weekly digital image to determine the percent cover of each plot. Root samples were also collected using a soil profiler tool. Root analysis was completed using the WinRHIZO program to measure root length (cm), root surface area (cm²), root volume (cm³), and average root diameter (mm). Root mass was determined with a laboratory balance.

¹TurfTech Bio-Mega is a microbial inoculant manufactured by Soil Technologies Corp. in Fairfield, Iowa

²Bac-Pack is an OMRI listed microbial inoculant manufactured by Soil Technologies Corp. in Fairfield, Iowa

Results:

The percentage green cover (Graph 1) was determined by taking pictures with a light box and was then analyzed through the Turf Analyzer Program. The first recorded data was taken after sprigging and prior to biostimulant treatment application. As can be seen before the application of biostimulants, there were significant differences in the cover percentages of the different treatments. This could be due to uneven sprig placement, areas where sprigs did not survive, or senescence of the turf leaves in transit and during application. TurfTech Bio-Mega had the highest cover percentage on 8/25 out of any of the data collection points during the experiment with almost 94% coverage. After 8/25 the coverage percentages began to decline due to a combination of scalping and senescence of the leaves.

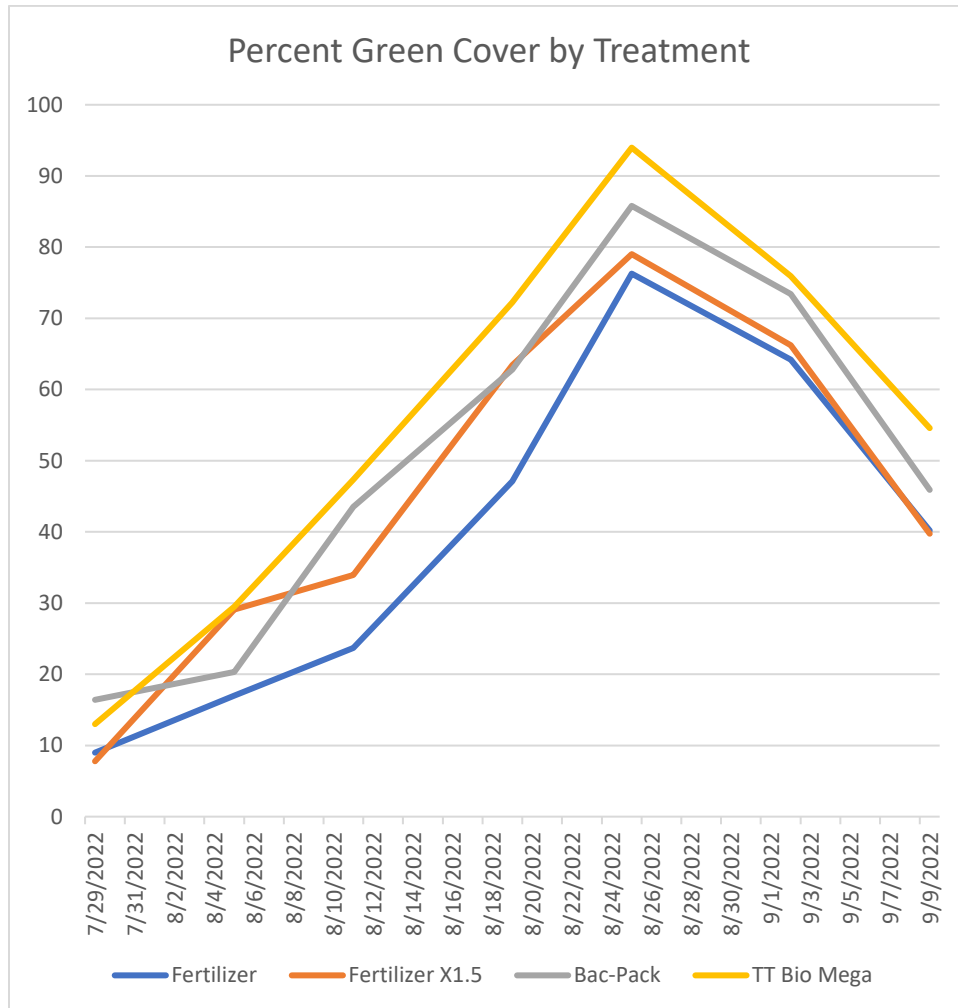


Figure 1. Biostimulant Percent Cover

Root Analyses (WinRHIZO)

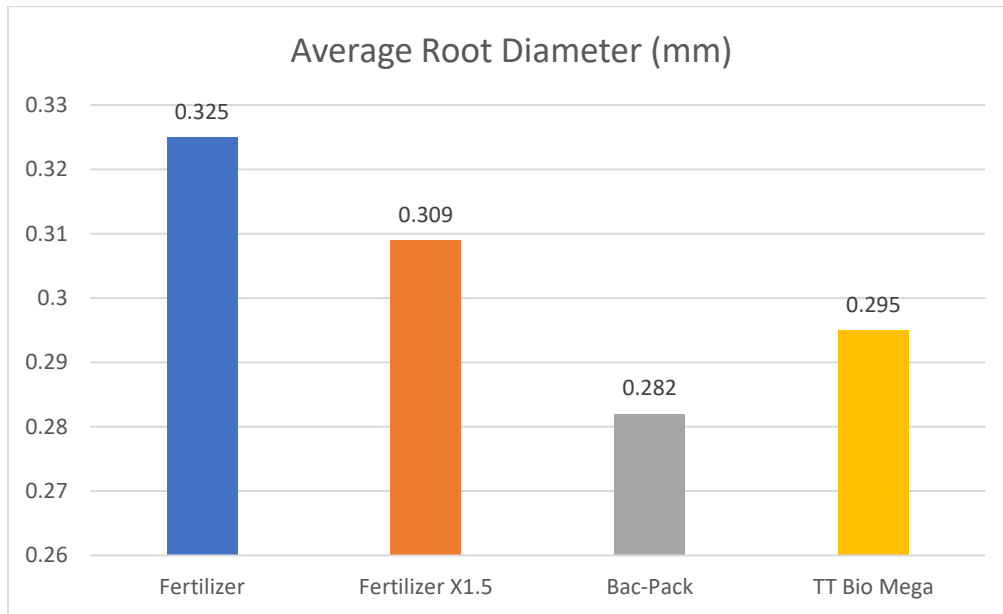


Figure 2. Average Root Diameter (mm)

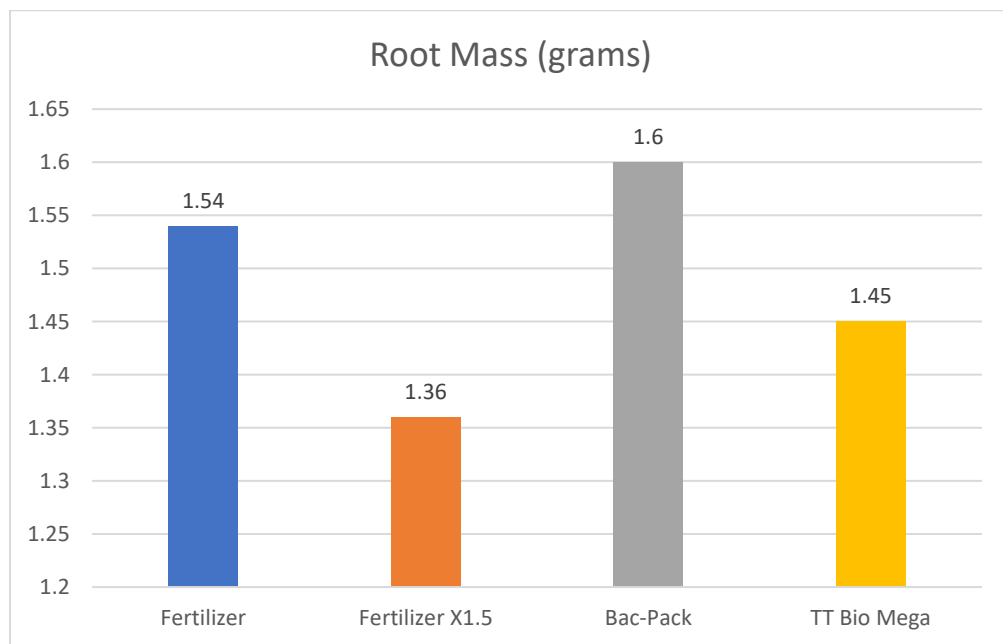


Figure 3. Average Root Mass (g)

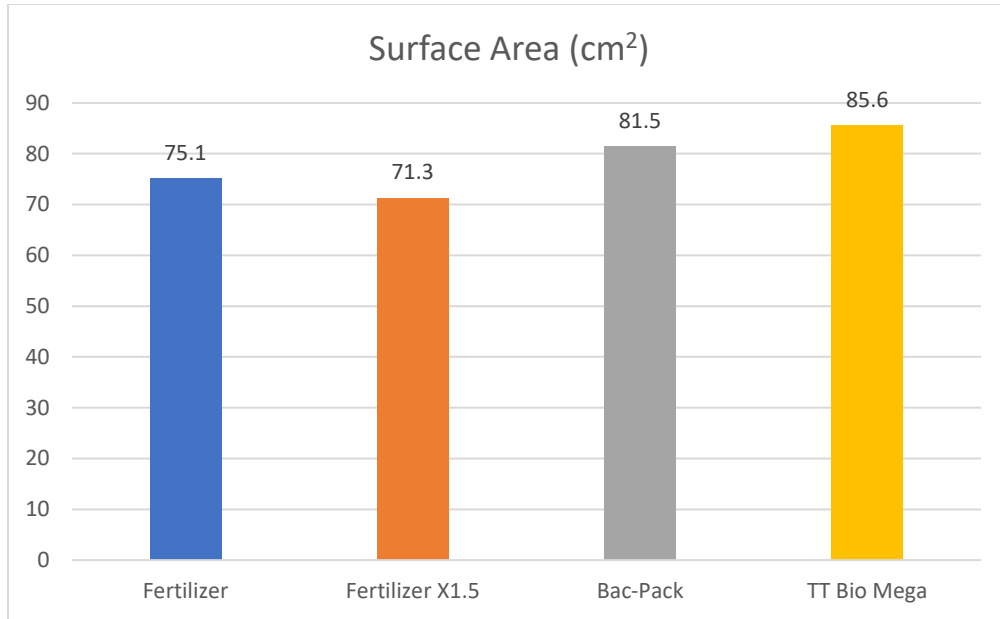


Figure 4. Root Surface Area (cm²)

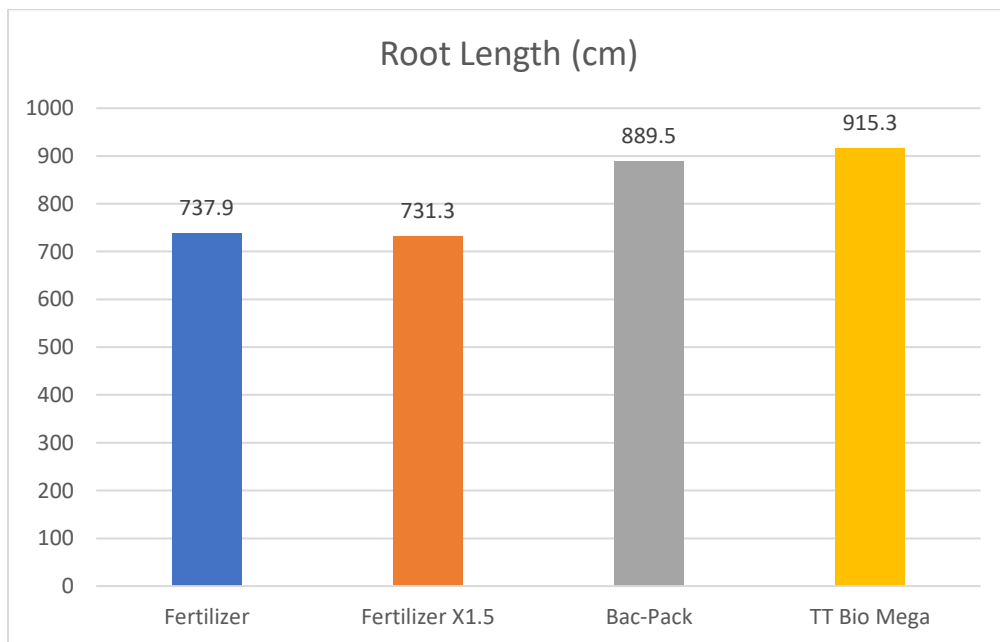


Figure 5. Average Root Length (cm)

The microplate fluorometric enzyme data (Figure 6) measuring carbon cycling (MUF G), nitrogen cycling (MUF NAG), and phosphorus cycling (MUF P) indicates that there was a statistically significant difference between products in carbon cycling within the soil. The carbon cycling data overall may be inconclusive due to influences during sand capping and leveling of the green before the sprigs were placed. The microplate reader showed that the assay was performed correctly, however, there were many zeros that came back for the treatments, therefore the p value is inconclusive because of the variability of the numbers that were returned from the test.

Enzyme Assay			
Treatment	MUF G	MUF NAG	MUF P
Fertilizer	4002	43454	194179
Fertilizer X1.5	9901	27430	200072
Bac-Pack	5735	32279	184000
TT Bio Mega	4665	98919	270959

Figure 6. Enzyme Activity

Conclusions:

The biostimulant products that were used in this grow in of Sunday ultra-dwarf bermudagrass did appear to have a positive impact on the speed of the grow in, with all of them achieving faster coverage than the regular fertilizer treatment by itself. A quick grow in benefits the playability of the ultra-dwarf bermudagrass greens because it allows for better weed suppression, earlier top dressing, rolling/cutting the green sooner, and allows for the surface to become puttable. Being able to implement these cultural practices as soon as possible is beneficial for the golf course since it will allow for the reopening of the course and/or moving off temporary greens. A faster grow in is also important because without strong cover in ultra-dwarf bermudagrass greens going into the fall, there is an increased risk of not being fully grown in by winter when temperatures drop and sunlight decreases, slowing down the growth of the turf. This could lead to winter kill of the turf because the canopy of the turf is not fully closed.

At a certain point all treatments leveled off. This is due to senescence of the leaves and some scalping as mowing commenced on the green. Although not seen as significant differences the treatments tended to have larger roots than those of the fertilizer treatments by themselves. On green turf this correlates with stronger, healthier plants that are less susceptible to disease, which is important in the heat of the summer in wet and humid weather.

Summary:

- In percent cover Bac-Pack displayed an 8.5% better coverage than the 1.5X fertilizer rate and TurfTech Bio-Mega displayed 19% better coverage than the 1.5X fertilizer. TurfTech Bio-Mega also had the most coverage of any treatment during the peak coverage date.
- During the experiment when there was a significant difference regarding coverage, TurfTech Bio-Mega was always in the A grouping.
- The TT Bio Mega had the highest nitrogen cycling numbers out of any of the treatments and was the second highest in phosphorous cycling.