Turf Summary for True Plant Sciences

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Analysis of turf grass utilizing AST's fungal Symbiotic product BioEnsure

I. 2013 Greenhouse Salt Stress

Greenhouse experiment looking at salt stress gradient. Symbiotic (S) treated plants had larger heights and shoot biomass compared to non-symbiotic (NS) plants.

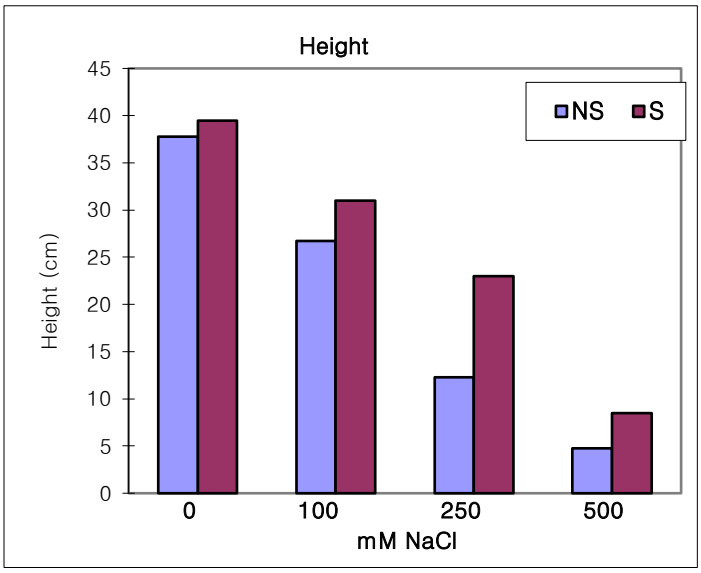

Figure 1. Height of symbiotic (S) and non-symbiotic (NS) turf under salt concentration gradient.

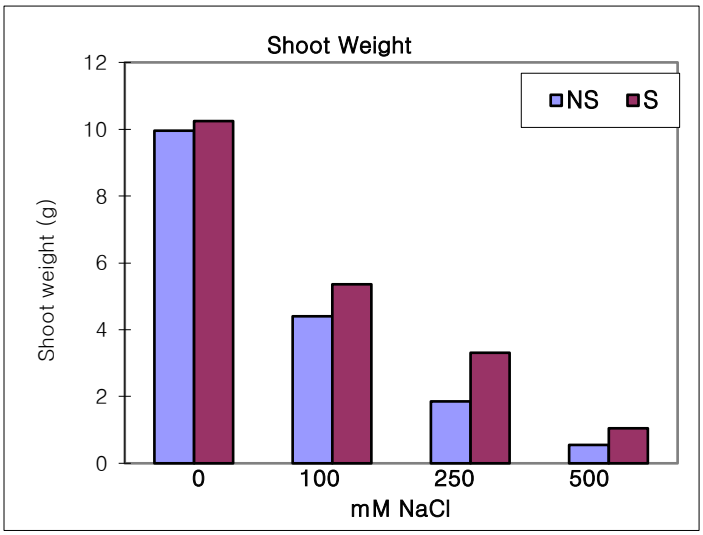

Figure 2. fresh shoot biomass of symbiotic (S) and non-symbiotic (NS) turf under salt concentration gradient.

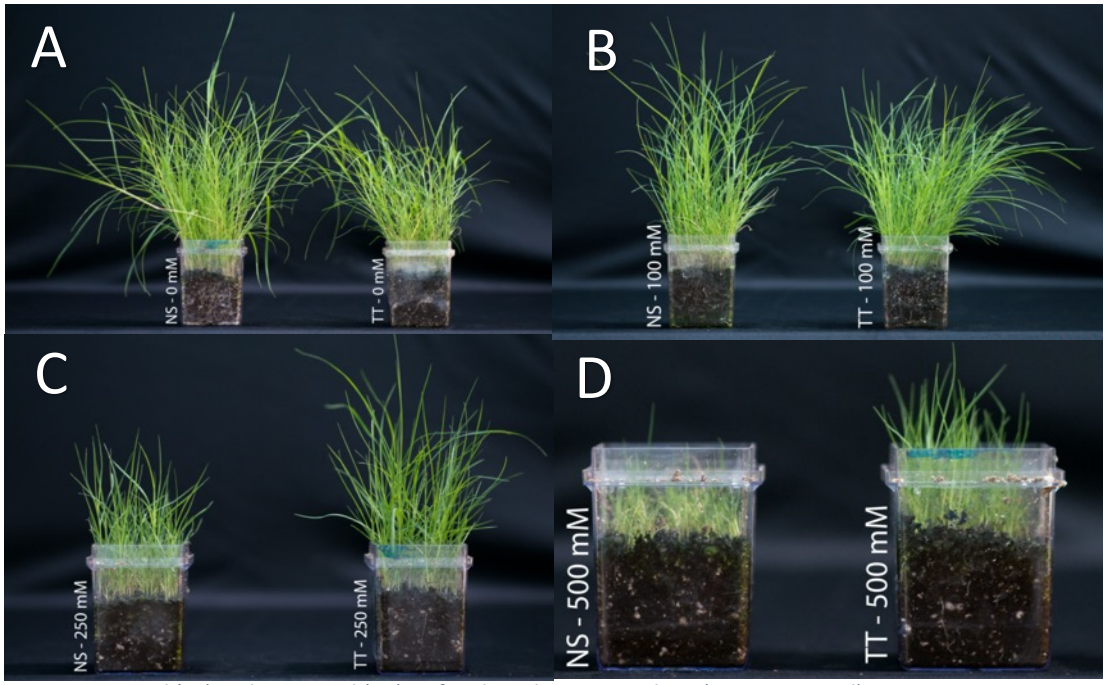

Figure 3. Treated (TT) and untreated (NS) turf under salt stress gradient (0-500mM NaCl).

II. 2015 Heavy metal contaminated soil

In 2015 soil samples were collected from a heavy metal contaminated site in Louisiana (LA). Turf grass was either untreated and non-symbiotic (NS) or treated and symbiotic (S), and seeded in contaminated soil in a greenhouse experiment.

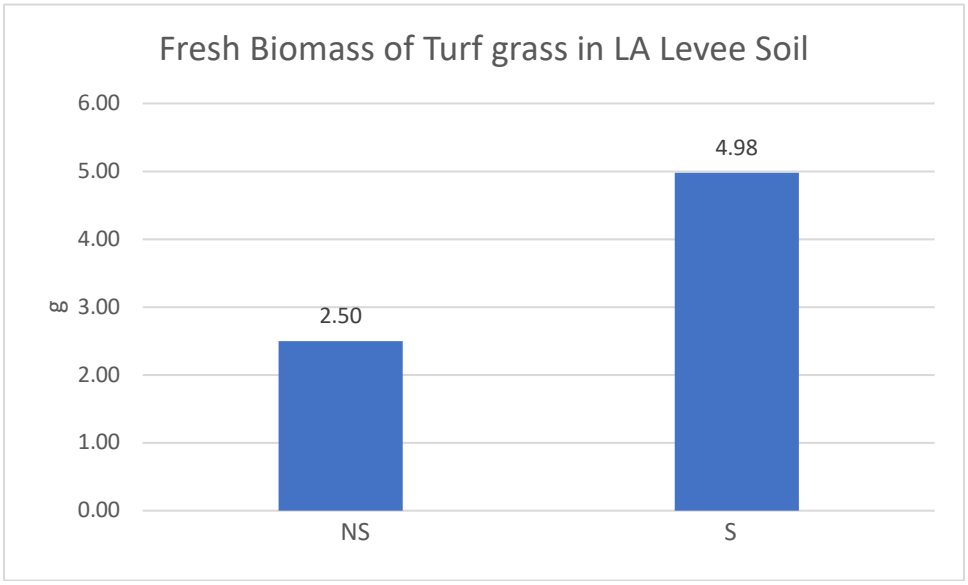

Figure 4.

III. 2019 Turf Grass Field Study

In 2019 AST conducted a trial with a CRO partner in Whitewater, WI.

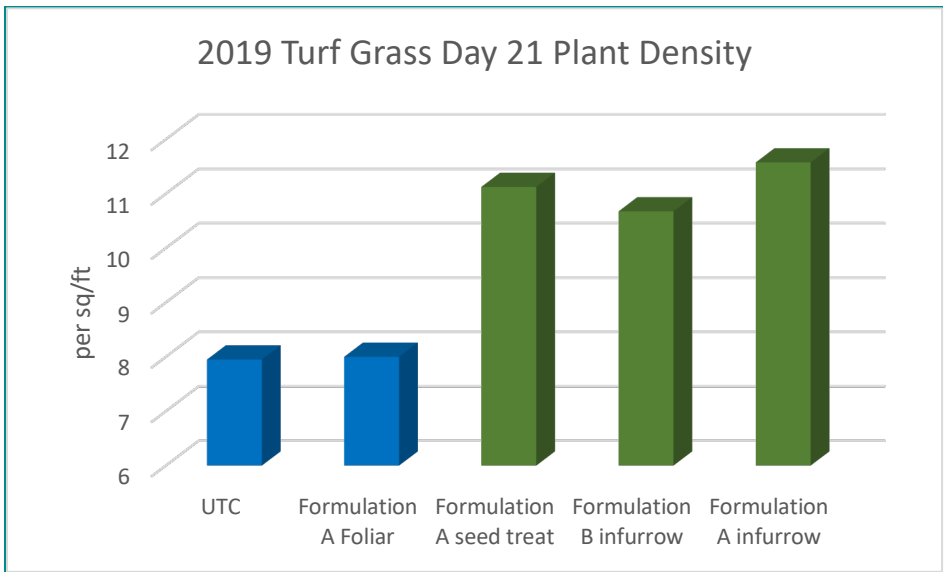

Figure 5.Plant density. Significant (p<0.05) increases observed in seed treated and infurrow application treatments compared to untreated control (UTC).

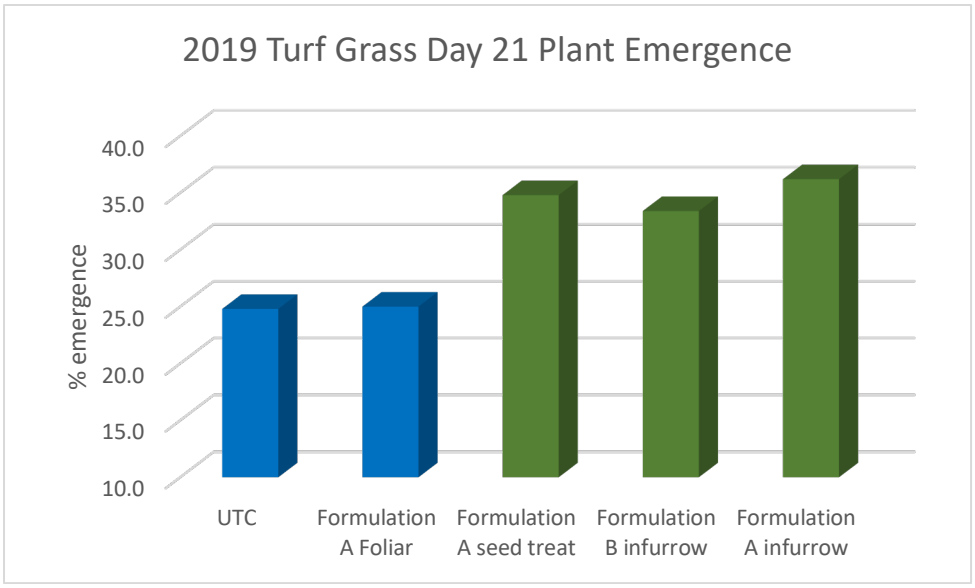

Figure 6. Significant (p<0.05) increases observed in seed treated and infurrow application treatments compared to untreated control (UTC).

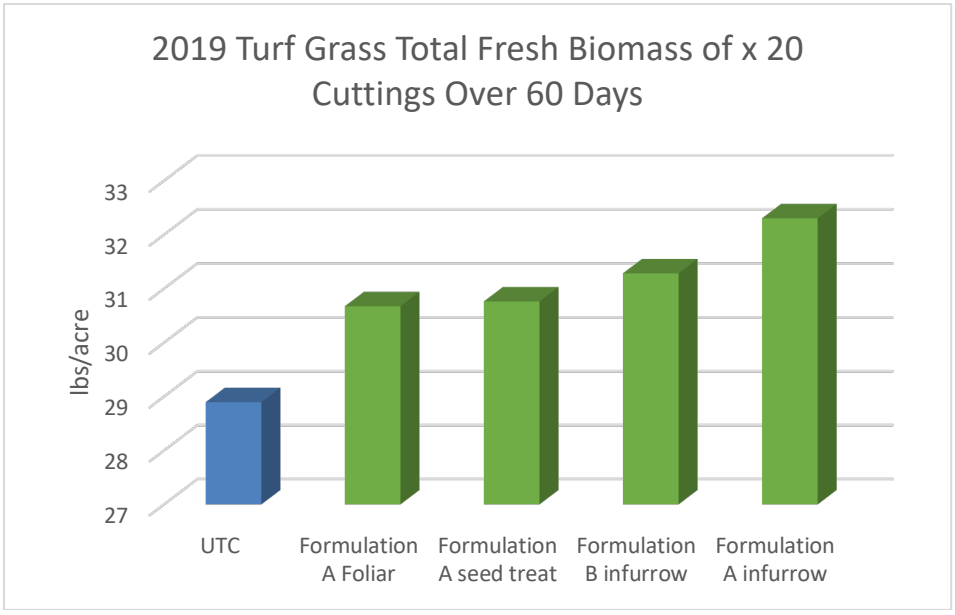

Figure 7.Total fresh biomass. Significant (p<0.05) increases observed in foliar, seed treated and infurrow application treatments compared to untreated control (UTC).

IV. 2020 turf field study

In 2020 AST conducted a trial with the same CRO partner in Whitewater, WI. Additional formulations were used in this study.

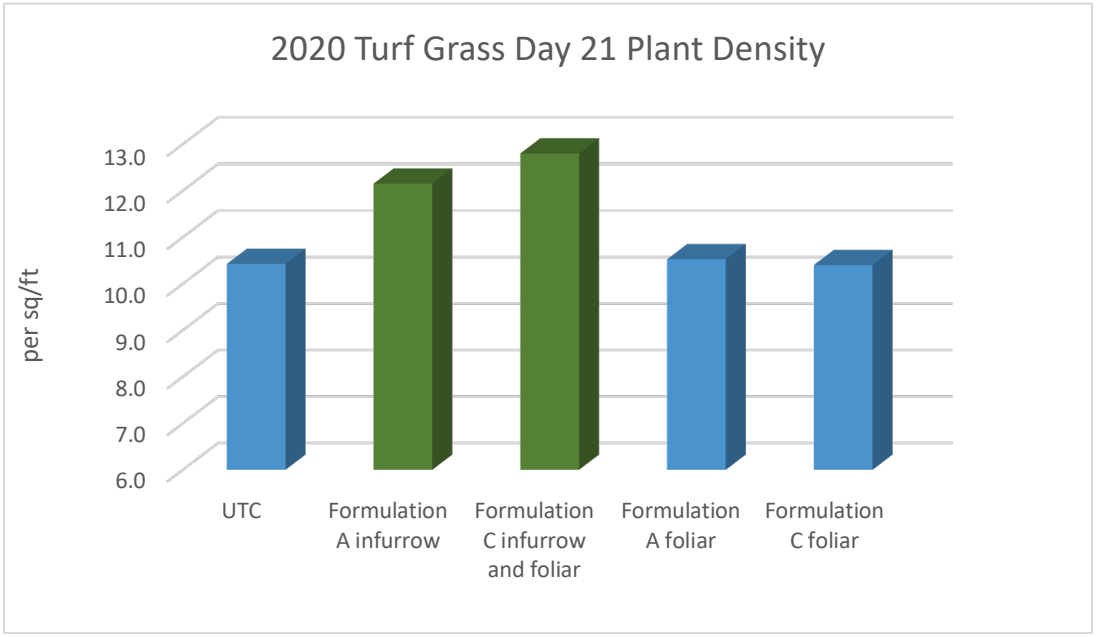

Figure 8.Plant density. Significant (p<0.05) increases were seen with formulation A applied in-furrow and formulation C when applied infurrow followed by a second foliar application compared to untreated control (UTC).

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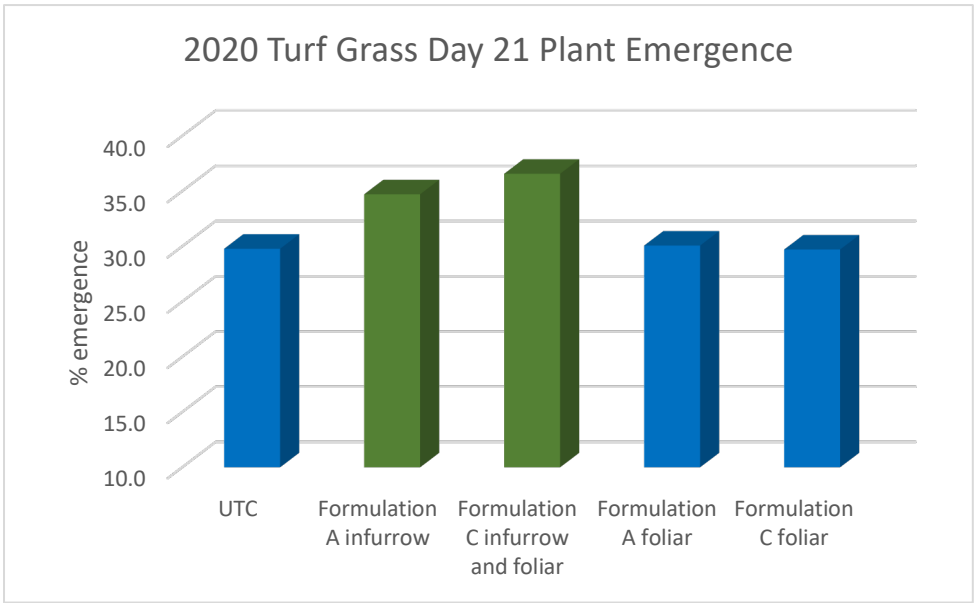

Figure 9.Plant emergence. Significant ($p<0.05$) increases with formulation A applied in-furrow and formulation C when applied infurrow followed by a second foliar application compared to untreated control (UTC).

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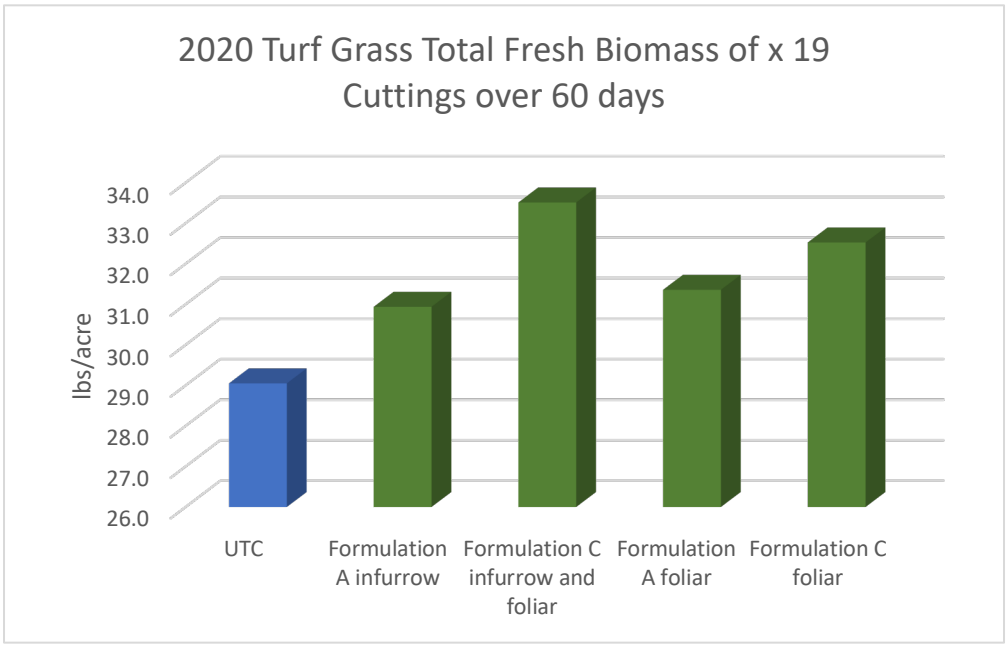

Figure 10. Total fresh biomass. All treatments had significant increases compared to untreated control (UTC)

Summary: All studies were conducted with AST's liquid formulation BioEnsure. Greenhouse and field studies show that BioEnsure contributes to increased biomass, plant density, emergence, and salt tolerance.