Effect of *Azospirillum Brasiliense* in combination with Variable Nitrogen Rates on Hybrid Bermudagrass Traffic Tolerance and Recovery

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INTRODUCTION

Bermudagrass is one the most commonly used species in athletic fields around Florida because of its ability of drought and traffic tolerance, however, it requires a high level of maintenance (Trenholm et al., 2024). Nowadays, applying nitrogen (N) fixing bacteria could be a useful way to increase the capability of nutrients absorption, disease resistant and fast recovery after traffic. Research is needed to determinate if the inclusion of *Azospirillum Brasiliense* (*Azb*) could be a solution to reduce the application of N fertilizers on sports fields. The project had 2 main goals:

1. Evaluate *Azb* on bermudagrass under different nitrogen rates.
2. Determinate the impact of *Azb* on turfgrass performance under simulated traffic.

METHOD

- Location: University of Florida Plant Science Research and Education Unit (Citra, FL, USA).
- Timing: Summer 2024 – Fall 2026.
- Cultivar: 'TifTuf' bermudagrass [*Cynodon dactylon* x *Cynodon transvaalensis*] on a native soil athletic field.
- Microbial Treatments (Initial treatments starting 2 weeks prior to traffic followed by monthly treatments; monthly treatments start 14 days after initial treatment):
  a. Tazo-B (*Azb* 2x10^5/ml) – 0.8 oz/1000 ft^2
  b. AzoPro Turf (*Azb* 2x10^5/ml) – 0.8 oz/1000 ft^2
  c. Azo Root (*Azb* 1x10^6/g) – 0.6 oz/1000 ft^2
  d. Non-inoculated Control
- Nitrogen Treatments (Monthly when traffic begins):
  a. Full Rate (1X) – 1 lb N/1000 ft^2
  b. 50% N Rate (1/2X) – 0.5 lb N/1000 ft^2
  c. Non-fertilized Control
- Experimental Design: Treatment combinations were arranged in a randomized complete block design with 4 reps.
- Traffic: 5 traffic events/week for a total of 25 traffic events using a modified traffic simulator.
- Data collection:
  a. During traffic season: Weekly – Normalized difference vegetation index (NDVI), visual quality ratings, percent green cover via digital images, volumetric soil moisture and surface hardness; Monthly – rotational resistance; Before and after traffic – Bulk density.
  b. During recovery period (after traffic): Weekly – NDVI, visual quality ratings, and percent green cover.
- Data analysis: All data subjected to analysis of variance (ANOVA) and treatment mean comparisons were separated using Fisher's Protected least significant difference (LSD) at the $p \leq 0.05$ level.

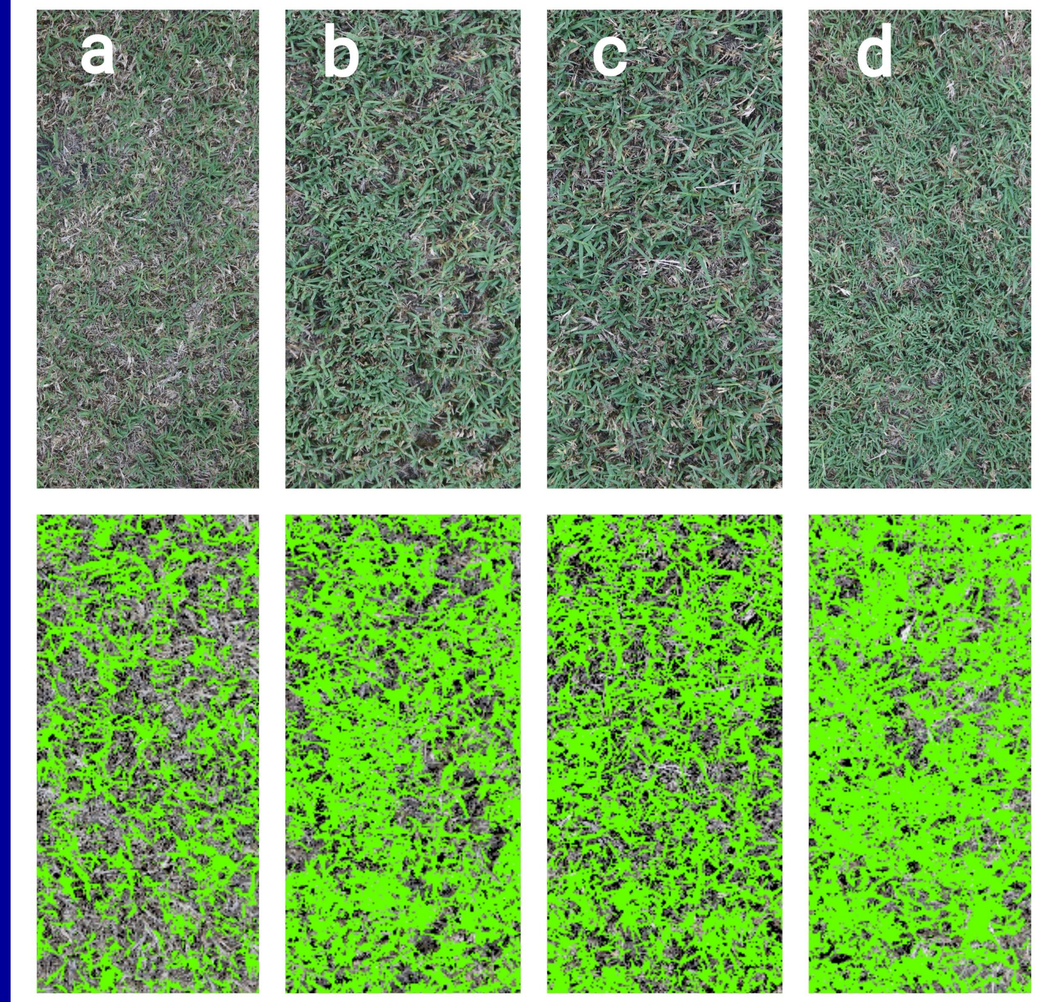

Figure 1. Percent green cover after 25 simulated traffic events. Left to right: a. Non-inoculated + 50% N rate; b. Inoculated with Tazo-B + 50% N rate; c. AzoPro Turf + 50% N rate; d. Azo Root + 50% N rate.

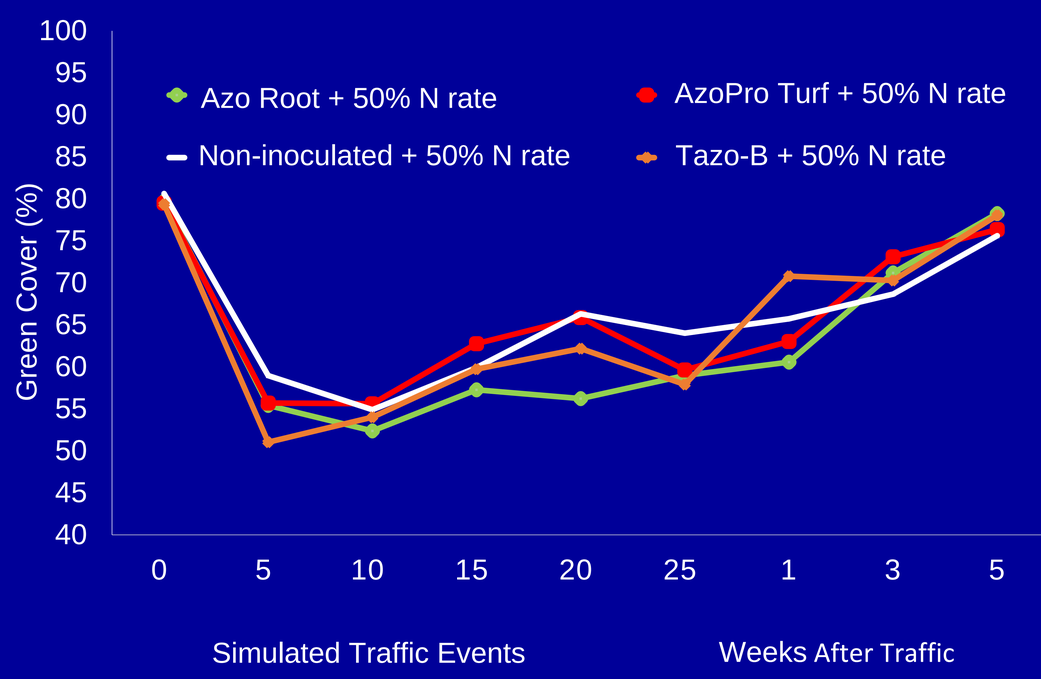

Figure 2. Effect of Inoculation *Azospirillum Brasiliense* products + 50% N Rate on 'TifTuf' hybrid bermudagrass percent green cover during and after simulated traffic events. Percent green cover was determined by digital image analysis.

RESULTS & CONCLUSION

During the experiment, all *Azb* products, applied with a 50% N rate, led to an increase in percent green cover, with no significant differences observed compared to the control, almost reaching 80% coverage percentage in the final week of recovery (Figure 1, 2).

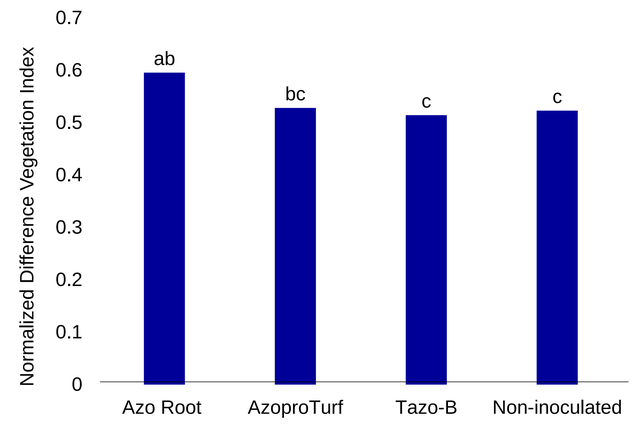

Figure 3. Effect of 3 different products containing *Azospirillum Brasiliense* without the inclusion of Nitrogen fertilization on 'TifTuf' hybrid bermudagrass Normalized Difference Vegetation Index during the recovery season.

Without N fertilization Azo Root exhibited an increased NDVI value compared to both Tazo-B and the non-inoculated control during the recovery season (Figure 3).

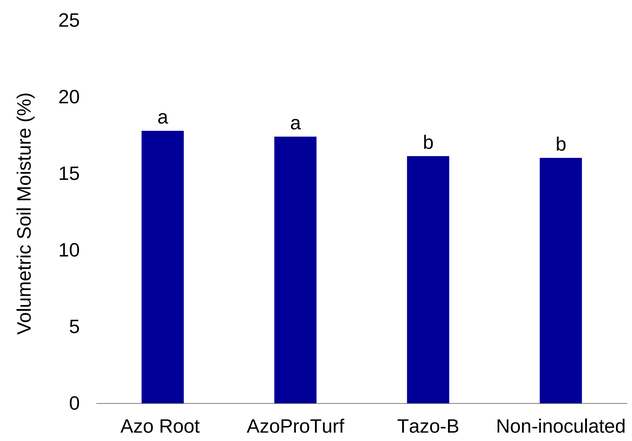

Figure 4. Effect of 3 different products containing *Azospirillum Brasiliense* on 'Tiftuf' hybrid bermudagrass Volumetric Soil Moisture subjected to simulated traffic.

After being subjected to simulated traffic, Azo Root and AzoPro turf products showed significant differences ($p < 0.05$) on the volumetric soil moisture compared to the Tazo-B product and non-inoculated treatments (Figure 4).

REFERENCE

Trenholm, L. E., Schiavon, M., Unruh, J. B., & Shaddox, T. W. (2024). Bermudagrass for Florida Lawns. https://edis.ifas.ufl.edu/publication/LH007