



Phenotype Screening  
CORPORATION  
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# Innovative Turfgrass Root Analysis Research Collaboration



Induced-Expression Phenotyping  
X-ray Technology





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## Innovative Turfgrass Root Analysis Research Collaboration

In 2020, Dr. Jim Brosnan, Professor, University of Tennessee and Phenotype Screening Corporation (PSC) collaborated to evaluate the effects of **Turf Power™** on annual bluegrass (*Poa annua*) rooting.

The collaboration provided a new and innovative way to evaluate rooting through the use of Phenotype Screening Corporation's induced-expression phenotyping. In 2004, PSC pioneered induced-expression phenotyping, the comparative study of how agricultural products affect plant development utilizing X-ray technology. Dr. Brosnan utilizing PSC's advanced technology has provided the turfgrass industry a precise look into Turf Power's effect on *Poa annua*:

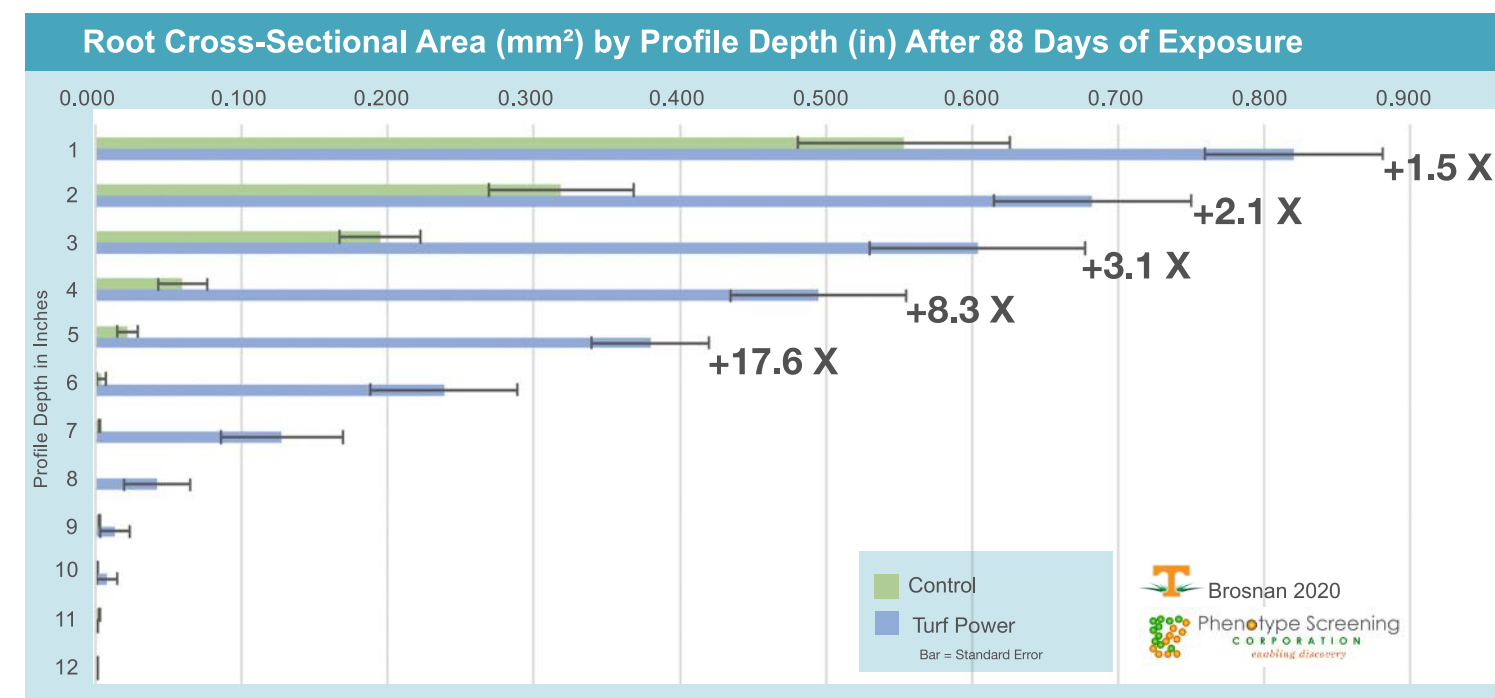
- Projected Root Area
- Total Root Length
- Root Distribution by Depth

### Background

Annual bluegrass (*Poa annua*) plants were grown from seed in an artificial rootzone profile. A Complete Nutrient Solution\* was applied to all plants throughout the entire evaluation and served as a control. Turf Power was fertigated at an 8.5% solution to half of the samples. After 88 days of exposure both the control and Turf Power treated plants were evaluated utilizing PSC technology.

## Proven to Increase Rooting Throughout the Profile

Applying **Turf Power™** inoculates the rhizosphere with microbial communities that allow the root mass to increase exponentially providing a healthier root system. A healthier root system provides improved tolerance to stress factors such as heat, drought, traffic and pest damage.



**Complete Nutrient Solution\*** - The Complete Nutrient Solution (CNS) was a 75% Hoagland Solution. A Hoagland Solution provides nutrients for plant growth, including both macro-micronutrients.

### Artificial Rootzone Profiles - X-ray Images Taken 88 Days After Exposure



X-ray Artificial Rootzone Profile



All studies included 6 replications of each treatment with a minimum of 4 subsets per replication

Root Area (cm<sup>2</sup>) per Plant after 88 Days of Exposure to TP



Root Dry Weight (g) per Plant after 88 Days of Exposure to TP





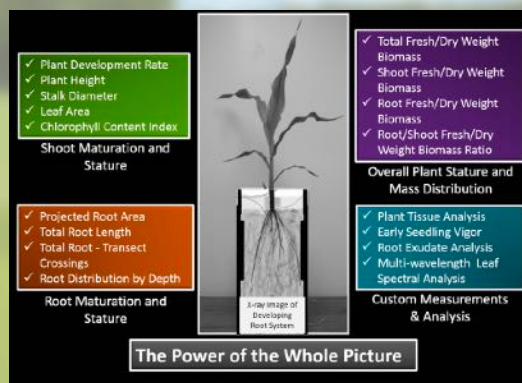
# About the Collaborators

Dr. Brosnan is a Professor in the Plant Sciences Department at the University of Tennessee (UT) and leader of their new Weed Diagnostics Center. His research focuses on effective and economical strategies for broadleaf and grassy weed control in various turfgrass systems, including golf courses, athletic fields and residential landscapes. His extension programs aim to provide education and diagnostic support to Tennessee's \$5.8 billion turfgrass industry.

Dr. Brosnan serves as an advisor to the Tennessee Turfgrass Association Board of Directors, and he is also actively involved in the Weed Science Society of America, Southern Weed Science Society, Golf Course Superintendents Association of America, and Sports Turf Managers Association. Dr. Brosnan received a B.S. in turfgrass science from Penn State University, and M.S. in plant, soil and insect sciences (turfgrass) from University of Massachusetts Amherst, and a Ph.D. in agronomy (turfgrass) from Penn State University.



**Phenotype Screening Corporation (PSC)** provides whole plant characterization services for agriculture, horticulture and environmental studies communities. Established in 2004, PSC pioneered induced-expression phenotyping, the comparative study of how agricultural products affect plant development. PSC explores impacts on shoot and root development, on leaf changes, including photosynthetic efficiency, on flowering and fruiting, and on root exudate composition. PSC serves an international clientele with customized facilities and equipment to assess genetic, environmental and treatment effects on plant-based food, fiber and fuel.



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