FOUNDATION NEWS

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PRESIDENT'S MESSAGE

Tim Walker, CGCS, President of Tri-State Turf Research Foundation

INSIDE THIS ISSUE

What Your Support Can Do for You!

Since its inception in 1992, the Tri-State Turf Research Foundation has remained true to its mission of *"building better golf and a safer environment through turfgrass research."* In fact, over the past 30-plus years, the Tri-State has committed more than one million dollars to research. This research is targeted at helping area turf professionals overcome a variety of troublesome turfgrass pests, challenges, and discover the most effective products and approaches to producing the best conditions possible in the most environmentally friendly way.

But sustaining this mission and the research critical to our success as turfgrass managers does not happen without the work and support of many. To start, we've had the support of six affiliated associations—the MetGCSA, Connecticut AGCS, the GCSA of New Jersey, the Hudson Valley GCSA, Long Island GCSA, and the MGA. These groups work together to manage our board and to evaluate and secure the most suitable research. But just as important are the countless number of contributions from individual clubs and companies over the course of those 30-plus years. It's your contributions, more than anything else, that have made our research possible.

These funds have allowed us to solicit the help of talented researchers at such universities as Rutgers, Penn State, Cornell, URI, UConn, UMass, and University of Maryland. Their work has helped us find solutions to our most troublesome, if not deadly, turfgrass pests and diseases. Starting with former Rutgers' researcher Dr. Bruce Clarke's summer patch research, our studies have sought solutions to such turf pathogens and insects as anthracnose, dollar spot, earthworms, and, of course, the annual bluegrass weevil. Our research dollars have also taken the guesswork out of selecting appropriate putting green root zone mixes and microbial and organic-based nutritional products, and the list goes on.

YOUR SUPPORT IS KEY

With that in mind, I want to take this time to personally thank all of those who have contributed to the foundation's research efforts in the past and encourage those who have not, to please join our list of supporters *(see pages 6–7)* with your donation of $300. At one time, there were approximately 200 clubs that supported the foundation. This past year, we had just below 100.

Please keep in mind that, when you contribute to the Tri-State, you are devoting just a small portion of your budget dollars to an effort that pays huge dividends. It's with your support, after all, that we are able to fund research essential to your operation, your turf, and your ability to do your job in the most efficient and environmentally responsible way possible. Quite frankly, the true benefactors of this research are the members and customers of your club!

To aid our fundraising efforts, we will also be continuing to ask clubs to donate foursomes, much like the Rounds for Research, as an alternative to a financial donation. This offers clubs the opportunity

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Putting ABW to the Test as Biological Weed Management Agent

Rutgers' Drs. Albrecht Koppenhöfer and Matthew Elmore and their Teams Investigate the Merits of Using ABW to Manage Annual Bluegrass in Creeping Bentgrass Fairways

Annual bluegrass is one of the most problematic and difficult-to-control weeds of creeping bentgrass fairways. Infested fairways often fail to produce quality playing conditions, particularly during the heat of the summer. Sadly, ridding creeping bentgrass fairways of this problematic turf weed is often challenging at best. Herbicides are not widely used for annual bluegrass control because they can cause injury to creeping bentgrass, as well as an overly rapid decline of the annual bluegrass turf, leaving large voids in the turfgrass canopy. Though one herbicide, Methiozolin, has shown promise in reducing annual bluegrass without harm to creeping bentgrass turf, its high cost may discourage superintendents from using it on fairways.

Superintendents commonly use plant growth regulators (PGRs), such as flurprimidol and paclobutrazol, to suppress annual bluegrass. But extensive research on putting greens and limited research on fairways has shown that annual bluegrass control from PGR programs is inconsistent, likely due to different annual bluegrass biotypes and lack of complementary cultural practices. Unfortunately, research on biological or natural agents for annual bluegrass control has been very limited. It has been demonstrated, however, that annual bluegrass weevil (ABW) has a strong preference for annual bluegrass, while creeping bentgrass, a less preferred host for the ABW, can tolerate three to four times higher densities of ABW larvae and is much more likely to recover from damage than annual bluegrass. Although creeping bentgrass fairways predominate in areas where ABW occurs, synthetic insecticides are usually applied repeatedly throughout the season to prevent ABW damage because these fairways are usually infested with annual bluegrass.

No research had been conducted on the use of ABW for annual bluegrass management until recently.

Between 2017 and 2019, Drs. Matthew Elmore and Albrecht Koppenhöfer and their teams from Rutgers investigated the use of ABW and the PGR paclobutrazol for the management of annual bluegrass in mixed CBG-ABG fairways. Overseeding did not affect annual bluegrass cover, likely because the regular irrigation necessary to aid creeping bentgrass establishment also allowed annual bluegrass to recover from limited ABW damage. The researchers' findings, however, indicated that threshold-based ABW control (treat only if damage starts to appear) can reduce annual bluegrass cover compared to industry-standard control programs while allowing only minimal and temporary loss in turf quality.

Further study indicated that ABW offered similar selective annual bluegrass control as one year's worth of monthly paclobutrazol applications (70 and 105 g/ha). ABW controlled annual bluegrass more effectively at lower annual bluegrass percentages, presumably because the egg-laying and with that larval populations tend to concentrate on the fewer ABW plants and therefore damage them more severely and more permanently. At the same time, with lower annual bluegrass populations, damage is less obvious and more acceptable. In areas with high annual bluegrass percentages, therefore, paclobutrazol alone could be used to reduce annual bluegrass cover to the point where ABW activity can be tolerated without compromising quality. At that point, paclobutrazol applications may be reduced or even eliminated and annual bluegrass management can be provided by ABW alone, thereby reducing the use of both PGRs and insecticides.

One key component in the implementation of this approach, however, still needed to be explored in more detail: the effect of creeping bentgrass cover on annual bluegrass control and turfgrass quality (i.e., the point when paclobutrazol applications could be reduced or stopped). The researchers hypothesize that more creeping bentgrass cover may allow for more annual bluegrass damage to occur before meeting a damage threshold.

In hope of determining the viability of threshold-based ABW management for annual bluegrass control in creeping bentgrass fairways, the Tri-State Turf Research Foundation has supported Dr. Albrecht Koppenhöfer and his research team in their work to transform a major insect pest of golf course fairways into a biological weed management agent. The final results of their work will be reported in the 2024 issue of *Foundation News.*

OBJECTIVE

Investigate the efficacy of threshold-based ABW management for annual bluegrass control in mixed creeping bentgrass/annual bluegrass fairways at different creeping bentgrass/annual bluegrass ratios.

METHODOLOGY

Two different field experiments were run in a field simulating fairway conditions at Rutgers Hort Farm No. 2 with a history of ABW infestation.

» *The first run of both experiments* was prepared in late summer 2020, started in spring 2021, and concluded in the fall of 2022.

» *The second run of both experiments* was prepared in late summer 2021, started in spring 2022, and is to be concluded in fall 2023.

Putting ABW to the Test as Biological Weed Management Agent

» In the late summer preceding the start of the experiment runs, different areas of the field were treated with a paclobutrazol program to achieve annual bluegrass covers of around 50%, 25%, 10%, and 0%, the balance being creeping bentgrass.

» During late April to early May of each year, overwintered ABW adults were vacuumed from other ABW-infested fields and spread throughout the experimental areas to ensure a uniform ABW infestation among plots.

» Post-emergence herbicides and fungicides were applied as necessary to control weeds but not injure annual bluegrass and creeping bentgrass.

Because the second run of both experiments is still ongoing (through fall of 2023), this data has not yet been analyzed. The following, therefore, is primarily a report on the observations made in the concluded first runs of both experiments.

Reduction of annual bluegrass with ABW using different insecticide programs at different annual bluegrass proportions (EXPERIMENT 1).

This experiment tested the effect of three ABW management programs *(preventive, threshold, no control)* at four different annual bluegrass percentages (50%, 25%, 10%, 0%) on the reduction of annual bluegrass and on turfgrass quality.

» There are four replications that consist of four whole plots (each 6.1 × 4.6 m) with one each of the four annual bluegrass percentages.

» The whole plots are divided into three subplots (1.53 × 1.53 m) that received one of three ABW management programs in the spring of 2021 and 2022 *(first run of experiment)* and in the spring of 2022 *(second run of experiment):*

- The *preventive program* is to completely prevent ABW damage by controlling both early instar larvae (cyantraniliprole at 175 g ai/ha applied on May 18, 2021 and May 17, 2022) and mid-instar larvae (indoxacarb at 252 g ai/ha applied on May 25, 2021 and May 24, 2022) of the ABW spring generation.
- The *threshold program* allows spring-generation ABW larvae to cause limited ABG damage. The plots were monitored closely to determine when ABW damage resulted in marginally acceptable (~ 5 on a 1 to 9 scale, 9 being ideal) turfgrass quality, at which time (June 2, 2021 and May 31, 2022) cyantraniliprole (293 g ai/ha) was applied to all threshold plots to halt further damage.
- In the third ABW program, *no insecticides for ABW control were applied.*

» Annual Bluegrass percentage cover in the plots was regularly estimated by two evaluators (values averaged) from peak annual bluegrass seedhead production in the spring through the duration of the growing season.

» To quantitatively assess creeping bentgrass and annual bluegrass cover, grid counts were conducted on a subplot basis using a 0.9 × 0.9 m grid with 200 intersection points at peak annual bluegrass seedhead production in early spring, in mid-summer, and in early fall. The presence of annual bluegrass, creeping bentgrass, or dead turf was noted for each intersection point.

» Turfgrass quality (1-9 scale, 9 being ideal) was regularly estimated by two evaluators (values averaged) on a subplot basis from peak annual bluegrass seedhead production in the spring throughout the growing season.

Reduction of annual bluegrass with ABW using a threshold insecticide program at different annual bluegrass proportions (EXPERIMENT 2)

This experiment examines in more detail the effect of the threshold ABW management program at four different annual bluegrass percentages (50%, 25%, 10%, 0%) on the reduction of annual bluegrass and turfgrass quality by making application decisions for each annual bluegrass percentage separately.

» Each of five replications contains one plot (1.53 × 1.53 m) of each annual bluegrass percentage in a randomized complete block design.

» If plots within an annual bluegrass percentage treatment reach the quality threshold, all plots of that annual bluegrass percentage treatment are treated with cyantraniliprole (293 g ai/ha).

» **In 2021,** this treatment was applied on May 28 for the 50% annual bluegrass plots and on June 2 for the 25% annual bluegrass plots in the first experiment run.

» **In 2022,** the 50% plots were treated on May 31, and the 25% plots were treated on June 6 in both experiment runs.

» The 10% and 0% annual bluegrass plots did not reach the threshold in both experiments in both years and were not treated. The sampling methods used are the same as for Experiment 1.

RESULTS

For the first run of Experiment 1, the observations of annual bluegrass cover through visual estimates, grid counts, and turf quality along with ABW population estimates are detailed in *Figures 1-3*.

(continued on page 4)

Putting ABW to the Test as Biological Weed Management Agent

» For the first run of Experiment 2, these observations are detailed in *Figure 4.*

» For the first year of the second run of Experiments 1 and 2, the observations of annual bluegrass cover through visual estimates, grid counts, and turf quality along with ABW population estimates followed a similar trend to the first run conducted in 2022. The data, however, still has to be analyzed.

CONCLUSIONS

The researchers suspect that their observations to date could have been affected by weather conditions. During much of the 2021 growing season, there was unusually high rainfall, and 2022 had above-average temperatures with very little rainfall from late June into September.

In late 2021, the researchers had already decided to run their experiments for two seasons rather than one, which given the highly variable weather conditions, turned out to be a good decision. Therefore, the final observations for the second run of both experiments (started in 2022) will take place in the fall of 2023.

Despite the possible influence weather has had on the study results, the researchers have been able to draw some conclusions based on the experiments' first runs and the first year of the second runs.

FIGURE 1

Effects of different initial annual bluegrass cover (0, 10, 25, 50%) and different ABW management programs on percent annual bluegrass cover determined by visual estimates during the 2021 and 2022 growing season (Experiment 1: First run).

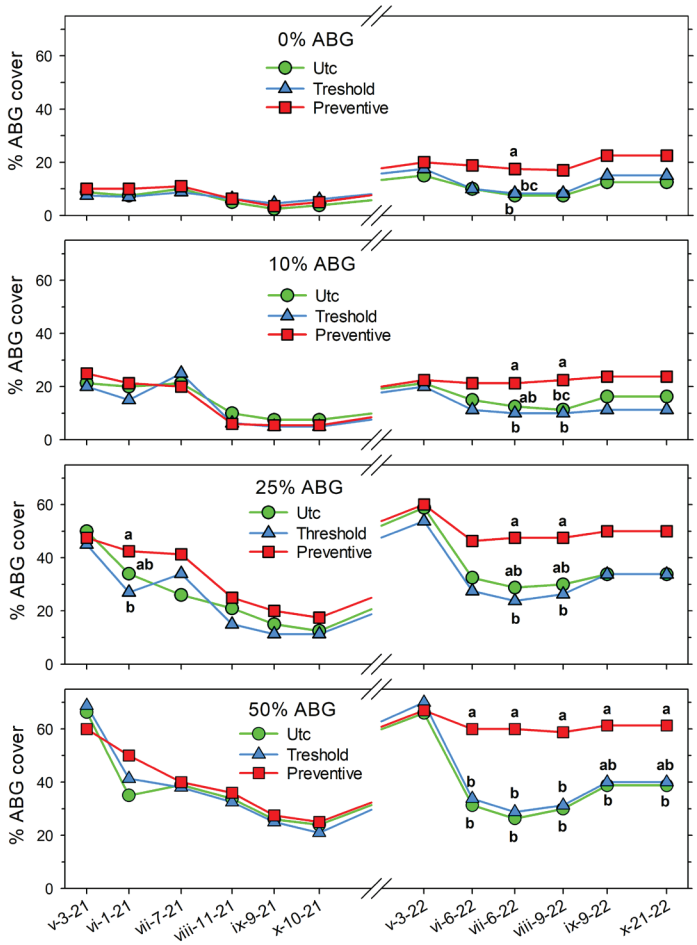
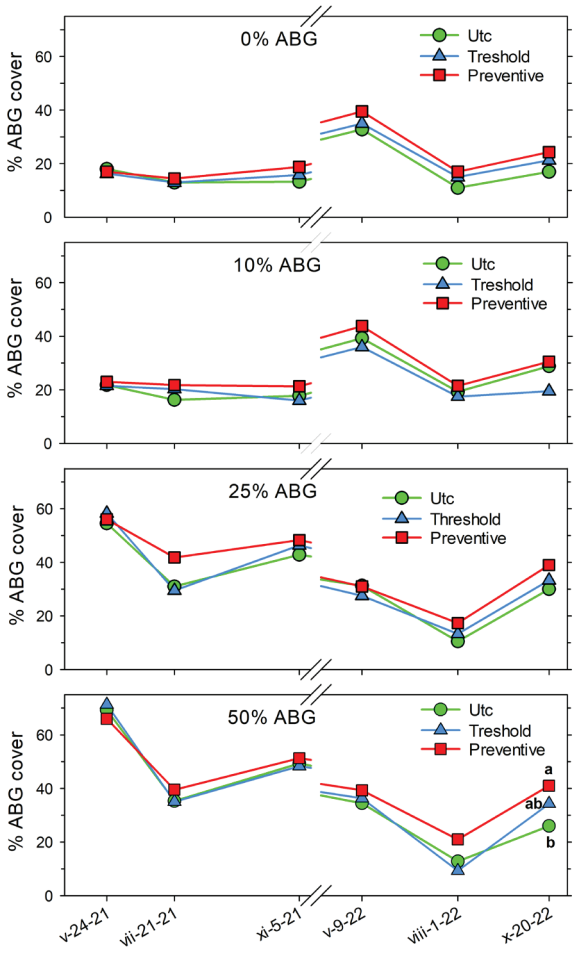


FIGURE 2

Effects of different initial annual bluegrass cover (0, 10, 25, 50%) and different ABW management programs on percent annual bluegrass cover determined by grid counts during the 2021 and 2022 growing season (Experiment 1: First run).



Putting ABW to the Test as Biological Weed Management Agent

» Annual bluegrass cover tended to decline throughout the season, especially in plots with higher annual bluegrass cover at the beginning of the year. The decline was the strongest between May and June when spring generation ABW larvae were active.

» The greater the decline in annual bluegrass from May to July, the greater the loss in turf quality.

» In all treatments, however, turf quality loss was only temporary. Quality was never below 5 and was never below 6 for more than about two weeks, except for three weeks in 2021 in the untreated 50% plots.

» During 2021, there was no clear and significant effect of the ABW management program on annual bluegrass cover. This may have been the result of a combination of two factors: relatively low ABW population densities and well-above-average precipitation rates throughout much of the growing season that limited ABW damage to annual bluegrass and allowed the annual bluegrass to recover better from it.

» During 2022, the annual bluegrass declined more in the threshold and untreated treatments, but there was a less clear effect on turf quality than in

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FIGURE 3

Effects of different initial annual bluegrass cover (0, 10, 25, 50%) and different ABW management programs on turf quality (1-0 scale, 9 being ideal) during the 2021 and 2022 growing season (Experiment 1: First run).

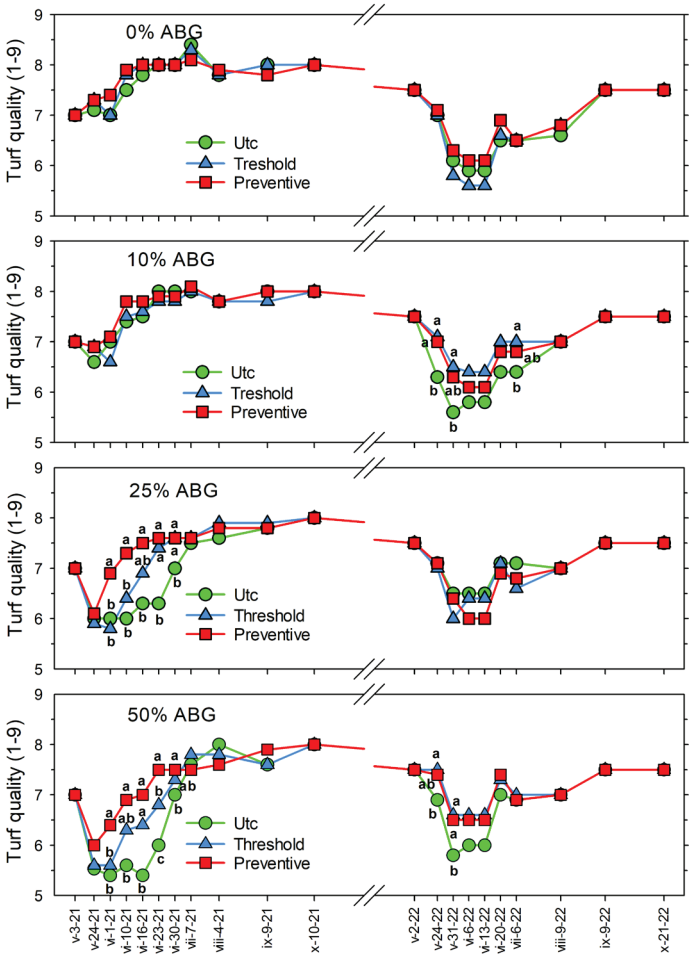
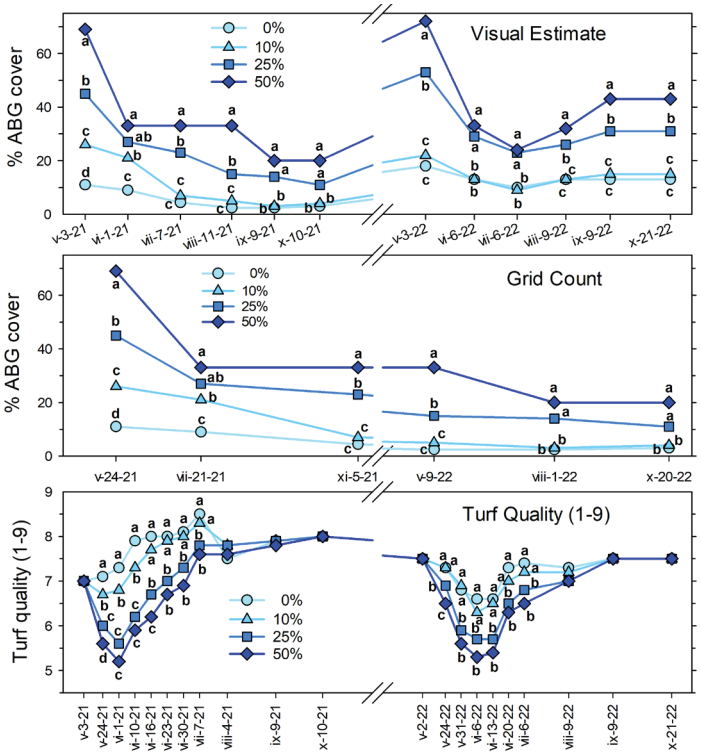


FIGURE 4

Effects of different initial annual bluegrass cover (0, 10, 25, 50%) on percent annual bluegrass cover determined by visual estimates or grid counts and on turf quality (1-9 scale, 9 being ideal) during the 2021 and 2022 growing season (Experiment 2: first run). All of a given annual bluegrass cover treatment were treated with an ABW larvicide when turf quality dropped to a quality threshold of around 5. Only the 25% and 50% plots were treated, both around late May/ early June.



Special Thanks to Our 2022 Contributors

We'd like to thank our contributors for their generous show of support to the Tri-State Turf Research Foundation. Your contributions go a long way toward helping the foundation continue its mission "to provide turfgrass research for better golf and a safer environment." We hope those of you on the list will continue to support the foundation's work. We also hope you will encourage more of your fellow turfgrass professionals to add their names to the growing list of contributors.

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RESEARCH UPDATE
(CONTINUED FROM PAGE 5)

Putting ABW to the Test as Biological Weed Management Agent

2021. Above-average rainfall during the time when ABW spring larvae were active may have limited the negative effects of their feeding activity on the turf quality. And when rainfall dropped dramatically thereafter, these hot and dry conditions may have limited the annual bluegrass recovery.

» Overall, the threshold approach for ABW management seems to be a viable alternative to the preventive approach for ABW management that will only result in very limited and transient reduction in turfgrass quality while allowing the ABW to help reduce the annual bluegrass cover.

» Based on the researchers' observations to date, this approach should be viable with initial annual bluegrass cover of at least up to 30% (note that the researchers' initial annual bluegrass cover was usually higher than the target percentage).

» Whether a higher initial annual bluegrass cover might be feasible will depend on how tolerant a specific golf course is to transient turf quality decline.

» If the goal is to more dramatically reduce annual bluegrass cover, either in speed or percent reduction, the approach will likely have to be combined with other methods to reduce annual bluegrass, such as periodic applications of the PGR paclobutrazol as done in the researchers' previous study.

■

For further information, you can reach Dr. Albrecht Koppenhöfer at a.koppenhofer@rutgers.edu.

Rutgers Researchers Seek Ways to Enhance Rooting and Resilience of *Poa Annua* Putting Greens

With annual bluegrass (*Poa annua)* proving difficult to eradicate from stands of other turfgrass species, many golf course superintendents with large populations of *Poa* have learned to accept, and even cultivate, annual bluegrass on their putting greens. While *Poa* can provide a high-quality putting surface, its inherently short root system makes it prone to heat stress and summer decline. When intermingled on greens with creeping bentgrass, which has significantly longer root systems, the *Poa* declines more rapidly, ultimately reducing the playing surface's uniformity and playing quality.

Poa's shallow root system requires intensive water management because the turf isn't able to take up water from deep within the soil profile. Enhancing root elongation and proliferation deeper into the soil is critically important for maintaining high-quality *Poa* putting greens during summer stress periods.

Hoping to enable turfgrass managers to avoid summer decline of their *Poa annua* greens cover, the Tri-State Turf Research Foundation has granted Rutger's Dr. Bingru Huang and researcher Sean McBride funding for a two-year study to develop effective management strategies to improve *Poa* root growth and maintain high-quality annual bluegrass throughout the summer months and in areas with limited irrigation.

OBJECTIVE

The objective of this study is to:

» determine biostimulant effects of *phytohormones* and *plant-growth-promoting rhizobacteria (PGPR)* on rooting characteristics in *Poa* managed under putting green conditions in field plots

» identify the effective biostimulant component to improve *Poa* root growth and turf performance during summer stress

METHODOLOGY: RESEARCH FARM TRIAL

The 2022 trial was conducted in field plots at Rutgers University Horticulture Research Farm (Field #18 D).

» The field site was established with mixed biotypes of *Poa* originally collected from the Rutgers University Golf Course and Plainfield Country Club.

» *Poa* turf plots were maintained as putting greens at a cutting height of 0.125 inches.

» A maintenance program was in place to control disease, including brown ring patch, dollar spot, anthracnose, and summer patch. Annual bluegrass weevil control was applied on June 10 and July 30 (Matchpoint 0.413 oz./1000 sq. ft.) in response to damage seen in early June.

» Field plots were irrigated adequately throughout June, but a malfunction of irrigation heads in combination with a drought resulted in dry spots in mid-July, where field plots were hand watered until August.

TREATMENTS

The following treatments were applied every 14 days throughout the summer from May 31 through August 25 by foliar spray. Each treatment was replicated in four 3' x 3' plots:

1: Control: plants were sprayed with 2 gal./1000 sq. ft. water

2: Seaweed Extract 1 (SWE-1): XP (6 oz./1000 sq. ft.), and Stress Rx (6 oz./1000 sq. ft.)

3: Seaweed Extract 2 (SWE-2): XP-N (6 oz./1000 sq. ft.), and Stress Rx (6 oz./1000 sq. ft.)

4: Aminoethoxyvinylglycine (AVG): 25uM solution

5: Strigolactone (SL): 10uM solution

6: Plant-Growth-Promoting Rhizobacteria strain WSF-23 (PGPR-1)

7: Plant-Growth-Promoting Rhizobacteria strain WSF-24 + WSF-14 (PGPR-2)

EVALUATION OF POA ROOT GROWTH AND TURF PERFORMACE

The following measurements were taken every two weeks to determine the dynamic changes in rooting and summer stress tolerance for *Poa* under putting green conditions as affected by the bacterial and phytohormone treatments.

TURF QUALITY EVALUATION

» Turf quality was visually rated on a scale of 1 to 9, with 9 indicating turf that is dense, green, and completely healthy. Dark Green Color Index was measured and calculated using SigmaScan digital imaging analysis.

» Canopy Temperature, a good indicator of plant physiological health for stress tolerance, was measured using infrared thermal camera (FLIR) images.

Of the treatments . . .

» Seaweed Extract 1 (SWE-1) and Seaweed Extract 2 (SWE-2) had the greatest effect on *Poa* turf performance. Both had higher turf quality during early July before a severe drought spell around July 19, and SWE-2 had greater turf quality in late August and early September. Turf treated with SWE treatments, particularly SWE-2, had greater darker green color throughout the summer.

» Two PGPR treatments had higher turf quality in August and Dark Green Color Index *(Figure 2a)* in most of July and August.

» The *aminoethoxyvinylglycine* (AVG) and *strigolactone* (SL) treatments at the tested rates had no significant effects on *Poa* turf performance throughout the summer.

Rutgers Researchers Seek Ways to Enhance Rooting and Resilience of *Poa Annua* Putting Greens

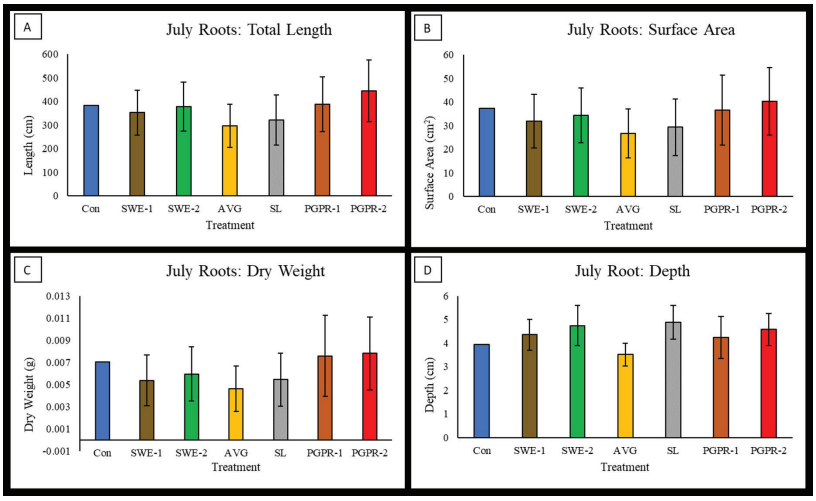

FIGURE 1

Root characteristics of *Poa* samples taken on July 15.

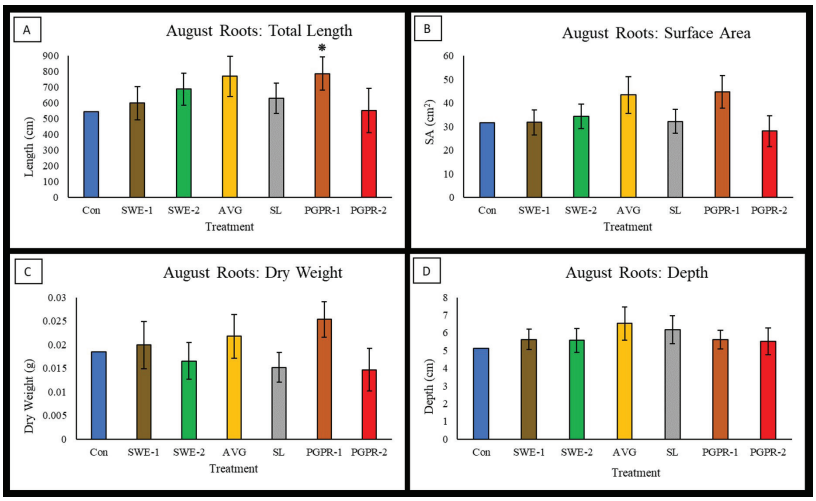

FIGURE 2

Root characteristics of *Poa* samples taken on August 11.

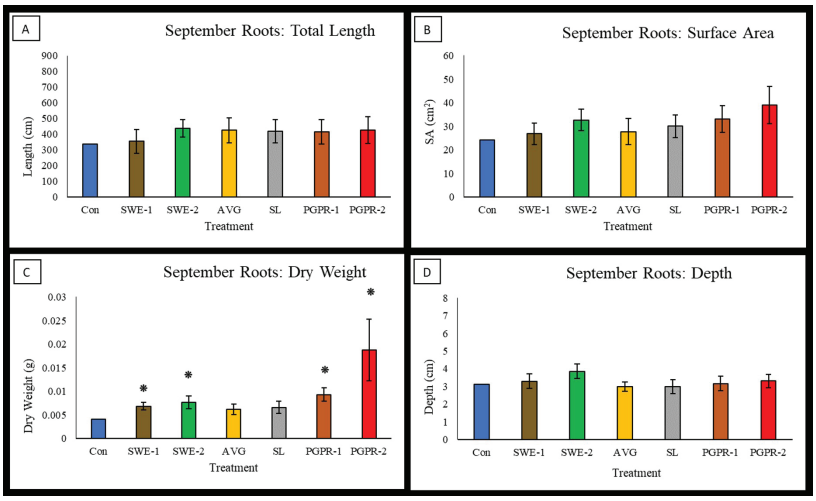

FIGURE 3

Root characteristics of *Poa* samples taken on September 9.

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Rutgers Researchers Seek Ways to Enhance Rooting and Resilience of *Poa Annua* Putting Greens

» None of the treatments had significant effects on canopy temperature throughout the test period.

ROOT GROWTH EVALUATION

» Root cores were harvested three times throughout the study on July 15, August 11, and September 8.

» Cores were 30.48 cm deep and 2 cm in diameter, and five subsamples were collected from each plot on each sampling date.

» Cores were then stored in 4° C, before being hand washed and analyzed using WinRhizo root scanning software.

» Root cores collected monthly from July to September have been processed and analyzed for the following characteristics: total length, surface area, diameter, dry weight, and depth.

» *Poa* characteristically has shallow root systems, resulting in the samples containing a high level of thatch. This thatch affected results, causing high variation within treatments.

» In July *(Figure 1)*, among all treatments, PGPRs had relatively greater total length *(Figure 1a)*, surface area *(Figure 1b)*, dry weight *(Figure 1c)*, and depth *(Figure 1d)* in July.

» In August *(Figure 2)*, PGPR-2 and AVG stood out as having relatively more developed roots across the different characteristics, with PGPR-2 having significantly greater total root length compared to the control *(Figure 2a)*.

» By September *(Figure 3)*, all treatments showed some positive effects of improving root growth. Both SWE and PGPR treatments had significantly greater dry weight than the control.

CONCLUSION

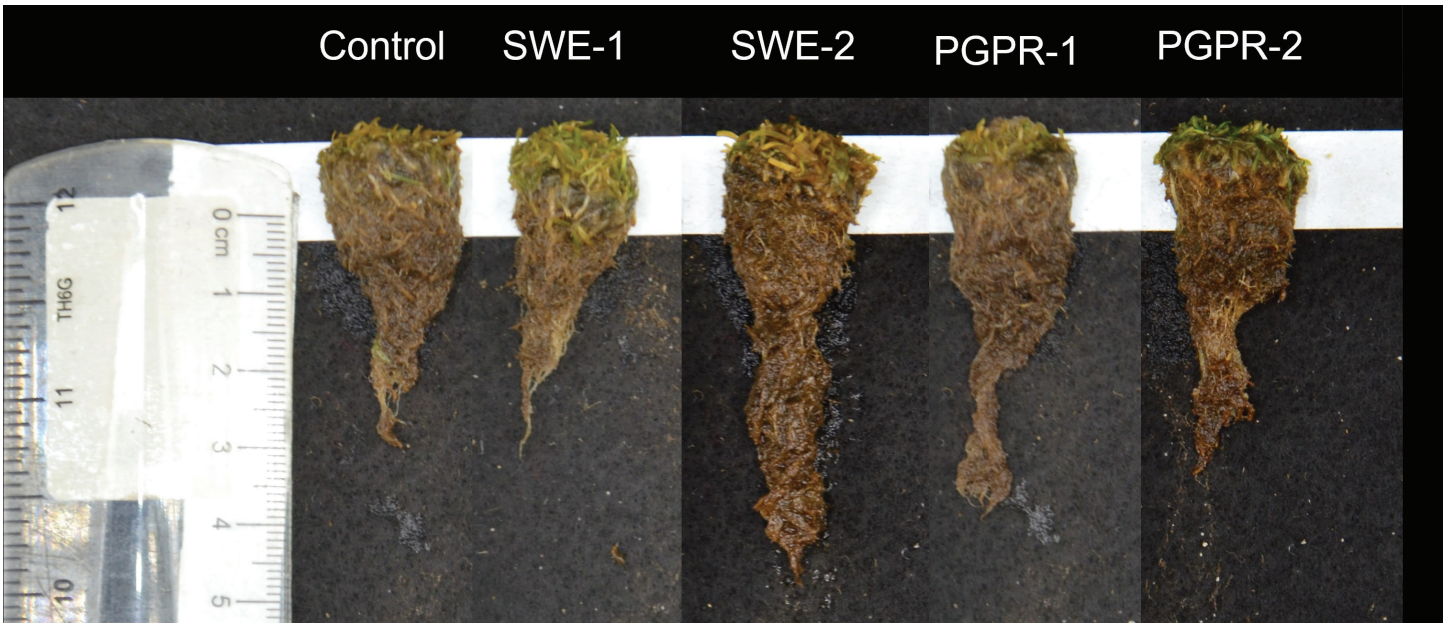
Of the treatments tested, the seaweed extracts, especially SWE-2, and the plant-growth-promoting rhizobacteria, particularly PGPR-2, seem to be the most promising in promoting *Poa* turf quality and root growth. A dry spell during the hot summer (July) caused severe desiccation of *Poa*, possibly diminishing the other treatment effects on improving heat tolerance.

This trial will be repeated in 2023 to confirm the results and determine how this year's dry weather may have affected the treatment's ability to promote *Poa* performance during the summer.

■

For further information, you can reach Dr. Bingru Huang at huang@sebs.rutgers.edu.

The photos illustrate positive effects of seaweed extract-based biostimulants (SWE-1 and SWE-2) and plant-growth promoting rhizobacteria (PGPR-1 and PGPR-2) on root growth of *Poa* in the summer.



Rutgers Researchers Set Out to Explore Silicon's Role in ABW Management

The annual bluegrass weevil (ABW) is one of the most problematic pests of short-mown golf turf throughout the Northeast and Mid-Atlantic and southeastern Canada. Because of its ability to develop resistance to most available insecticides, there is a dire need for effective and sustainable alternatives to synthetic insecticides.

In preliminary research, Dr. Albrecht Koppenhöfer and his team observed positive effects of Silicon (Si) fertilization in ABW management. In *Poa annua*, Si fertilization reduced ABW egg-laying by 7-16% and larval numbers by 0-30%, although developmental speed was unaffected. In creeping bentgrass (CBG), Si fertilization reduced ABW egg-laying by 15-25% and larval numbers by 20-52%, and it slowed development.

Before assumptions can be made, the researchers plan to confirm this data in larger and repeated experiments in the greenhouse and then in the field. The stronger negative effect on ABW in CBG is particularly interesting as it would give the more desirable and ABW-tolerant CBG an additional advantage over *Poa annua* and could be used to outgrow *Poa annua*. It could, therefore, work in concert with the researchers' earlier findings that threshold control of ABW can be used to reduce the proportion of *Poa annua* in mixed *Poa annua*-CBG fairways.

The experiments will be focused on determining the effects of solid (Calcium Silicate) and liquid (silicic acid solution) Si fertilization on ABW egg-laying and larval development speed and survival rate in *Poa annua* and CBG. Experiments will be conducted in the greenhouse first. Then the concept will be tested in the field with the best Si treatments from the greenhouse experiments.

Hoping to help turfgrass managers find a reliable and environmentally friendly solution to ABW, the Tri-State Turf Research Foundation has granted Rutger's Dr. Koppenhöfer funding in 2023 for a two-year study on the effects of Si fertilization on ABW management. If the researchers' preliminary observations can be confirmed, Si fertilization would help keep ABW numbers below damage thresholds in many situations and should make CBG, which is already much more tolerant of ABW feeding than *Poa annua*, almost immune to ABW damage.

The greater benefits of Si fertilization to CBG could help creeping bentgrass outcompete *Poa annua* in mixed stands. In combination with a threshold approach to ABW management with insecticides, Si fertilization could be highly effective in reducing *Poa annua* in mixed *Poa annua*-CBG stands, and help transform a major insect pest, the ABW, into a biological weed management agent of *Poa annua*.

In addition to reducing insecticide use, this approach would prevent insecticide resistance development in ABW and allow natural enemies of ABW and other turf insect pests to play a more significant role in suppressing pest populations, further reducing the need for insecticides. It would greatly improve the environmental stewardship of superintendents and the image that much of the public has of the golf course industry.

OBJECTIVE

The objective of this study is to determine if the application of silicon (Si) induces resistance to ABW by reducing egg-laying and larval development and survival in *Poa annua* and creeping bentgrass.

METHODOLOGY

Greenhouse Experimental Treatments

Besides a control (no Si application), various rates and intervals of silicon applications will be studied in the greenhouse. Larval development and survival will be monitored to ascertain the optimal silicon application strategies.

Field Tests

Based on findings in the greenhouse experiments, field experiments began in April 2023 and 2024 at the Rutgers Horticultural Farm No. 2 by applying the more promising of the treatments described for the greenhouse studies.

Watch for the outcomes of year one of the Rutgers research team's trials in the next issue of *Foundation News*.

For further information, you can reach Dr. Albrecht Koppenhöfer at a.koppenhofer@rutgers.edu.

What Your Support Can Do for You!

to donate a foursome for the charity buzz raffle. Be on the lookout for these requests later in the season. A special thank you to Rich Duggan and Blake Halderman for handling this campaign.

YOUR RESEARCH DOLLARS AT WORK

In this issue of *Foundation News*, you will see your research dollars at work with several projects in progress or newly funded. Each study has the added bonus of seeking environmentally friendly solutions that involve minimal use of pesticides.

Rutgers' Dr. Bingru Huang has completed the first of a two-year study to develop effective management strategies to improve *Poa annua* root growth and maintain high-quality annual bluegrass throughout the summer months and in areas with limited irrigation. Dr. Huang's study will no doubt prove particularly useful to the many superintendents attempting to cultivate annual bluegrass on their putting greens.

Dr. Albrecht Koppenhöfer of Rutgers has completed his second year of research on optimizing the use of the annual bluegrass weevil to control annual bluegrass in creeping bentgrass fairways. With the resistance to and loss of many control options, it is important that we develop the most comprehensive Best Management Practices available to reduce our dependence on these products. Dr. Koppenhöfer will be conducting another year of this study (at no charge to us) because of the extreme weather in both 2021 and 2022. So be on the lookout for next year's summary!

Last but not least, the Tri-State will also support Dr. Koppenhöfer's two-year study on the viability of silicon in inducing resistance to the annual bluegrass weevil in annual bluegrass and creeping bentgrass. Dr. Koppenhöfer's hope is that silicon fertilization will help keep ABW numbers below damage thresholds in many situations, making creeping bentgrass, which is already much more tolerant of ABW feeding than *Poa annua*, almost immune to ABW damage. Creeping bentgrass, then, could outcompete annual bluegrass in mixed stands, making for a more uniform and quality playing surface.

LOOKING AHEAD

Again, a plea for your support: Though in 2022, our number of donations trended upward from 74 the prior year to nearly 100 this year, I ask you to continue that positive trend in 2023. If you want to know more about the Tri-State Turf Research Foundation, please turn to the back of this newsletter for a chapter representative whom I am certain would be happy to talk to you. Also feel free to visit our website, www.tristateturf.org, to view our research, past and present, or to make a donation.

Speaking of our chapter reps, please join me in welcoming new board member, Chris Johnson, who is one of our Long Island directors. New to the executive board is Rob Alonzi, a MetGCSA rep who has assumed the role of secretary, and Jennifer Torres, a GCSANJ rep who joins Rich Duggan as one of the two vice presidents on the board. I want to thank Tom Kaplun for his years of service to the board, most recently as a vice president.

Finally, I wish everyone the best for a safe, successful, and worry-free 2023. If there is anything that the Tri-State can do to help you succeed this year, be sure to reach out. Thank you, again, to all who have contributed, and enjoy the great research literature to follow.

Tim Walker, CGCS
President
Tri-State Turf Research Foundation

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