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Hole Notes

The Official Publication of the MGCSA

Vol. 54, No. 6 July 2019

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Special Interest

Dr. Horgan Pictorial
Western Exposure

Pages 18- 19
Page 29

Mark Your Calendar:

August 19

Northeast Exposure at Lakeview National
Host Nathan Beckman

August 26

Badgerland Exposure at Eau Claire CC in Eau Claire WI
Host Nick Peinovich

September 5

The Championship at Oak Glen Golf Club
Host Pete Mogren



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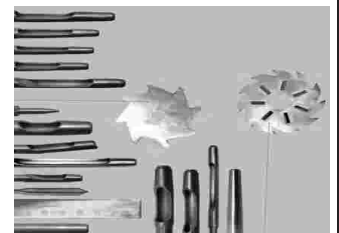
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Feature Articles:

- A Tribute to Dr. Brian Horgan, Through the Years** pages 8 - 17
 By various authors
- 18 Years at The UMN; Brian’s Final Interview** pages 20 - 25
 By Matt Cavanaugh, Editor
- EIQ: What is YOUR Environmental Impact?** pages 26 - 41
 By Mike McCall CGCS, Executive Director MetGCSA
- Dollar Spot Control Using Urea and Iron Sulfate** pages 42 - 47
 By Chase Straw and Brian Horgan UMN
 Kurt Hockmeyer, Doug Soldvat and Paul Koch UW Madison
- thick-skinned - second grader “declan”** pages 48 - 51
 By Matt Cavanaugh, Rush Creek Golf Club

Monthly Columns:

- Presidential Perspective** pages 6 - 7
 By Matt Rostal
- In Bounds** pages 52 - 55
 By Jack MacKenzie, CGCS

Editorial Committee

Matt Cavanaugh
 MATTC@UMN.EDU
 Liza Chmielewski
 LIZA@GERTENS.COM

On the Cover
This issue; a tribute to Dr. Brian Horgan with appreciation for 18 years of support. Thank you Brian!

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Presidential Perspective

by Matt Rostal, Superintendent Interlachen Country Club

I hope everyone had a great July 4th holiday. Personally, I spend about 6 hours at the club setting up for Interlachen Country Club's annual cookout, carnival and fireworks display. It has been a tradition for many years. Then the rest of July 4th has always been spent with family and friends celebrating our Independence Day. It started when I was a young child growing up in Apple Valley as our house was on the parade route and my parents had a gathering for the festivities every year. Then, when my brother and I were old enough to 'really' join in, it became more of a party for our friends. The tradition of celebrating the 4th has continued my entire life and I always look forward to seeing friends and family.

I heard some very sad news

which happened to the Donnacha O'Connor family on July 4th. Donnacha and Holly's 20 year old daughter, Onna, had a very serious accident in Thailand while riding a motor scooter. She was thrown from the scooter and suffered some very serious injuries. She has been in the intensive care unit at Bangkok Hospital and received a blood transfusions and is now somewhat stabilized. Donnacha flew to Thailand and has been with her for the last few days. Her mother, Holly, is hoping to fly to Thailand soon so she can be with her for her long recovery. Onna is expected to be in the hospital for the next few weeks and, due to her injuries, will not be able to travel home for the next few months. The O'Connor family will incur a significant financial burden as Onna recovers in Thailand prior to healing enough to travel home to Minnesota. A Go Fund me page has been set up to

support the O'Connor family and I am imploring everyone to donate. My thoughts and prayers are with Onna for a quick and full recovery. The Wee One Foundation was developed for situations exactly like what the O'Connor family is unfortunately experiencing. It is to assist Golf Course Management professionals who incur overwhelming expenses due to medical hardships without comprehensive insurance or adequate financial resources.

This year the Wee One tournament, on October 7th, is moving to Le Sueur Country Club. The move from Brackets Crossing Country Club is due to the decision to regrass greens and fairways starting in September caused by the significant winter damage incurred this year. A big thank you must be given to Le Sueur Country Club for stepping up to offer the significant support to the Wee One Tournament.

It is even more evident this year

that we must have a tremendous turnout for this event at Le Sueur. A request is formally being submitted to the Wee One Foundation for the O'Connor family.

The Wee One Foundation may decide to have all the funds raised at the event in Le Sueur go directly to support Onna's recovery. I am asking for support from members of the MGCSA to sign up and fill the event at Le Sueur Country Club. We can make a very serious contribution by stepping support the Wee One! We have the opportunity to do something very impactful for the O'Connor family and Onna!!

I thank you all for your consideration and support.

Insight

One Turf Professional's Perspective

Dr. Brian Horgan

University of Minnesota

Course and Statistics

University of Minnesota TROE Center in St. Paul. I oversee 21 acres of turf used primarily for research.

Years in the Business

I have been in the turfgrass industry for 15 years. I started work at Montgomery Country Club in Olney, MD. Then worked at Faulkwood Shores Golf Course in Howell, MI. Interned at Old Baldy Club in Saratoga, WY. Shifted focus in the turf industry to research at Michigan State University, North Carolina State University and the University of Illinois.

Why and/or How Did You Enter The Turf Management Industry?

Love of outdoors. Love of answering questions.

Who Was Your Professional Mentor and Why?

Mike Sullivan. Mike was the first Superintendent that I worked for who took time to explain the "why" and also the benefits of turf to our environment

What Has Been the Highest Point in Your Career?

Getting a faculty position at a Big Ten university.

What Has Been Your Lowest Point?

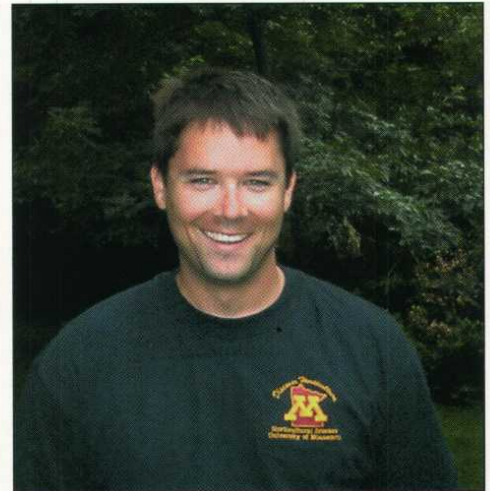
In the midst of building a newly defined turf science program at the University of Minnesota, having one faculty member retire and one resign, leaving me doing the job of three.

Are Your Greatest Challenges Political, Agronomic or Managerial?

Political. The University is a great place to work if you are familiar with the politics involved.

Is It Hard to Find Good Help in Your Area of the State?

Yes, especially people with experience that we can keep longer than a growing season.



Dr. Brian Horgan
University of Minnesota

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Where Would You Like To Be in Ten Years?

Here at the U, tenured.

What Is Your Perspective of Our State Association and What Would You Change?

It seems as if the association has a group of 75 people that participate in association sponsored events. Those 75 people are great to work with but we often lose site that this is a small percentage of the membership and should actively recruit member participation.

Name Your Foursome, Who Would You Play With and Why?

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- The Refuge Golf Club
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- Windsong Farm Golf Club
- Wayzata Country Club
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A Meeting with the Secretary of Agriculture



PICTURED WITH THE SECRETARY OF AGRICULTURE are, from the left, Kevin Morris, NTF; Tom Delaney, PLANET; Bob Shearman, Ph.D., University of Nebraska; Clark Throssell, Ph.D., GCSAA; Secretary of Agriculture Johanns; Ike Thomas, TPI, Mike Kenna, USGA, Brian Horgan, Ph.D., U of M, and David Williams, Ph.D., University of Kentucky.

Last year I was honored by my peers to be elected to the National Turfgrass Federation Board of Directors. The mission of this board is to elevate turfgrass science as a discipline and lobby for federal funding for research and extension. Over the last four years, the NTF has successfully lobbied congress to establish a turfgrass research program under the United States Department of Agriculture - Agriculture Research Service (USDA-ARS). Currently, the USDA-ARS has hired three scientists that are located across the country. The long-term goal is to assist USDA-ARS in hiring 20 turfgrass scientists with \$2,000,000 in discretionary research funds to be used in conjunction with University faculty across the country. These discretionary funds could, for example, be directed to the University of Minnesota to perform collaborative research projects with the USDA-ARS scientists.

To continue the lobbying efforts, members of the NTF board of directors recently met with Secretary of Agriculture Mike Johanns in Washington, D.C.

The meeting included Tom Delaney, Professional Landcare Network; Mike Kenna, Ph.D., USGA Green Section; Clark Throssell, Ph.D., GCSAA; Bob Shearman, Ph.D., University of Nebraska; Brian Horgan, Ph.D., University of Minnesota; David Williams, Ph.D., University of Kentucky; Ike Thomas, Turfgrass Producers International, and Kevin Morris, National Turfgrass Federation, Inc. The purpose of the meeting was to discuss the turfgrass industry and the National Turfgrass Research Initiative.

—Brian Horgan

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World Renown Facility Breaks Ground

*By Jack MacKenzie CGCS, Superintendent North Oaks Golf Club and
Dr. Brian Horgan, Turfgrass Extension Specialist, University of Minnesota*

Vision: The University of Minnesota will be recognized for its leadership in environmentally sound and responsible turfgrass systems. An aggressive statement? Perhaps. But the quest of a determined group of turf scientists to become leaders in the industry will not be stopped. Through dedication, promotion and implementation, the University of Minnesota is in the process of developing a program worthy of national and international acknowledgement.

During a period of time when the U of M has been rocked by sports scandals and an almost across the board budget reduction, one specialized group in the university system stands alone, unscathed and even growing. The Turfgrass Working Group, comprised of faculty from the departments of Agronomy and Plant Genetics, Plant Pathology, Entomology, Soil, Water and Climate and Horticultural Sciences, has made an incredible move forward in the progression of turfgrass science. This diversified collection of departments recently acquired the space necessary to move ahead with the development of a new turfgrass facility on the St. Paul campus.

Up until the early part of April, the University's only

Education (TROE) Center. Four programmatic research themes, (1) alternative plant materials, (2) general production, (3) pest management and (4) environmental quality, were created to help define the importance of the TROE Center.

After a broad description had been created, the Turfgrass Working Group identified specific needs:

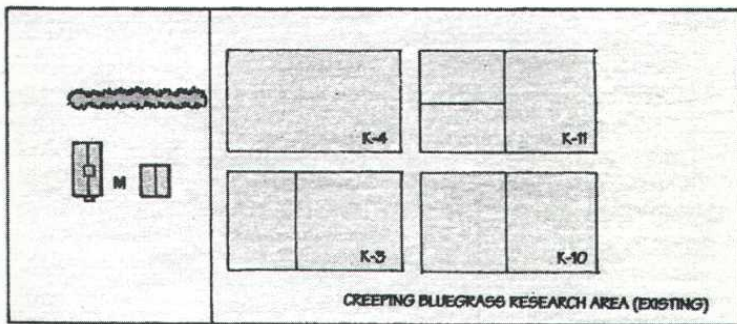
- + 5.9 acres to be used for short term (< 2 years)
- + 6.4 acres to be used for medium to long term (2-5 years)

Outreach programming and undergraduate and graduate education

+ 2.2 acres for the undergraduate outdoor laboratory which will include a shade research area

+ 1.5 acres of land would provide infrastructure such as parking, buildings and wash areas

(Continued on Page 7)



dedicated turfgrass research facility was located on 4.5 acres of the St. Paul campus. While very nice to have, this area was barely large enough to adequately support a limited research program. For the past few years the site has been dedicated to a creeping bluegrass breeding program. Additional space was needed to create the program envisioned by the Turfgrass Working Group.

A diligent search located 16 acres of terrain off Cleveland Avenue and near the existing research facility. In order to procure the property, a plan had to be developed which provided a framework for the creation, occupancy and construction of the new Turfgrass Research, Outreach and

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TROE Center-

(Continued from Page 5)

Once compiled, the information was condensed into a 27-page report and presented to the Dean and Associate Deans of the College of Agriculture, Food, and Environmental Sciences. The presentation did not just focus on the TROE Center, it described a process to attract new undergraduate and graduate students, develop innovative outdoor applied laboratories, further develop outreach and extension activities, and intimately involve the turfgrass industry. And approve they did, embracing the idea and dedicating over 16 acres of University property to the TROE Center project.

idea and dedicating over 16 acres of University property to the TROE Center project.

Timing is everything. Already, because of the Drive For The "U" Program, industry leaders, individual members of the Minnesota Golf Course Superintendents Association, and members of the Minnesota Turf and Grounds Foundation have contributed in-kind donations of over \$115,000.. This program, the catalyst for the TROE center, began two years ago with a prophetic vision of the development of a first class research facility dedicated to turf related studies.

And even timelier, phosphorous pollution concerns have prompted political action. During the most recent Legislative session, both the house and senate have reviewed bills designed to reduce the potential for phosphorous pollution perceived to be contributed to by the application of fertilizer upon turfed surfaces. As part of the

LEGEND FOR COVER PHOTO

PROPOSED SITE NOTES	EXISTING SITE NOTES
A. RESEARCH BUILDING	K-3. SAND GREEN & EXPANSION AREA
B. PESTICIDE STORAGE OUT-BUILDING	K-4. GENERAL RESEARCH
C. GAS TANKS	K-10. LITTLE BLUESTEM
D. MATERIALS STORAGE BINS	K-11. CREEPING BLUEGRASS / GREEN / TEE
E. ENTRANCE SIGN & GARDEN	M. STORAGE BUILDINGS
F. TEE BOX	
G. FAIRWAY	
H. 1 ST CUT ROUGH	
I. WILDFLOWERS (NON-TRADITIONAL ROUGH)	
J. SAND TRAP	
K. TURF TRAP	
L. GREEN	

proposed law, the golf course industry will be required to develop and monitor a fertilizer application program and create a location for the development of a phosphorous run off research program.

What an exciting time for the University of Minnesota, the MGCSA and homeowners in the state. The results of dedicated individuals have created a facility sure to educate private individuals and the industry alike. Soon the University of Minnesota will be renowned for its prestigious Turf Program and research projects implemented at the TROE Center.

Watch for upcoming articles relating to specific research projects and funding information.

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TROE CENTER UPDATE

By Dr. Brian Horgan
University of Minnesota

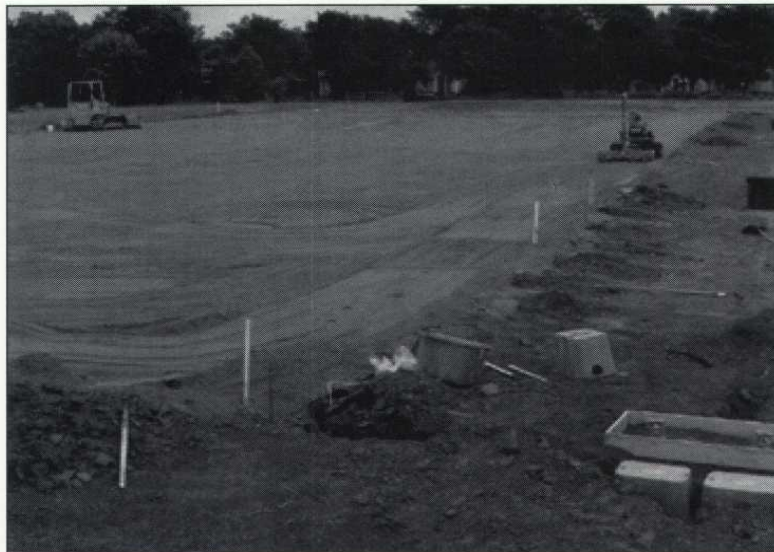
We didn't waste any time following the groundbreaking ceremony for the new Turfgrass Research, Outreach and Education Center on the St. Paul Campus.

EXCAVATION: On July 25, the College of Agriculture Food and Environmental Sciences had a formal ground breaking ceremony for the TROE Center held in conjunction with the most successful Turf Field Day to date. Immediately following the ceremony, the Hartman Company began excavating the soil for the USGA specification green designed by Jeff McDowell of Bonestroo and Associates. By August 1, 2002, the Hartman Company had installed the drainage tile, donated by Prinsco, and filled in the cavity with 4 inches of pea-gravel donated by Plaisted Companies.

IRRIGATION: Irrigation design and all irrigation parts for the green were provided by MTI and The Toro Company. From August 7 through August 13, the irrigation was installed by Premier Irrigation and staff from the University of Minnesota Turf Program. The irrigation design, as seen in the photo, may seem as a bit of overkill. However, the focal point of the irrigation system is individual control of 10 by 10 foot areas in a 2500 square foot portion of the green. These micro-irrigation plots will enable researchers at the U to use water rates as a treatment in the experimental design. In addition, scientists from the United States Department of Agriculture donated 8 lysimeters that were installed in the green within the micro-irrigation plots. In short, the combination of the micro-irrigation plots and the lysimeters will be used to measure the amount of water necessary to leach nutrients and pesticides through the USGA green.

TOP-MIX: Following the installation of the irrigation system, on August 15 and 16, the top-mix, which was donated by the Plaisted Companies, was delivered. Again, the Hartman Company moved the top-mix and leveled the surface to a specified 1.5% slope. Seeding as to be completed by August 31 with seed and fertilizer donated by Simplot Partners.

THANK YOU FROM THE UNIVERSITY OF MINNESOTA: All of companies mentioned in this brief update on



the TROE Center and the dozens of others that made this possible deserve a sincere thank you. For all of you that participated in the "Drive for the U" program, thank you. For all of the members of the MGCSA research committee that donated their time and energy in helping make the green a reality, thank you. The University of Minnesota appreciates all of your support and efforts and I personally look forward working with you in the future. **STAY TUNED.....**

TROE Center Green Construction Vendor Participants

DRAIN TILE
Prinsco Pipe

SITE DESIGN
Jeff McDowell, Bonestroo Assoc.

EXCAVATION & DRAINAGE
Hartman Co.

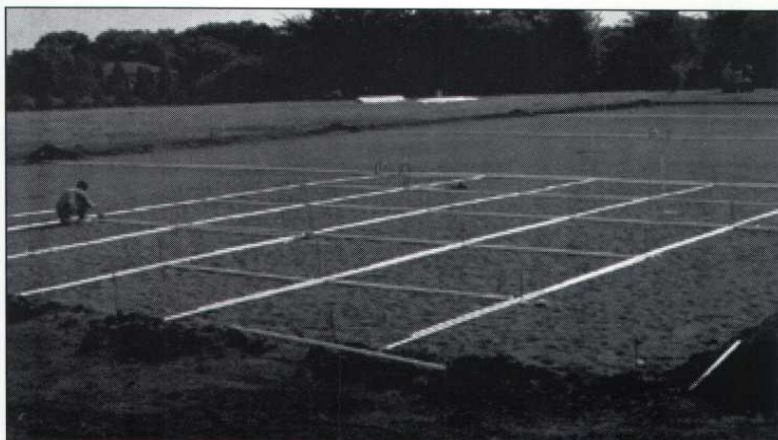
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Dr. Brian Horgan - A Minnesota Wonder!

By PAUL DIEGNAU, CGCS
Superintendent, Keller Golf Course

If you are a turfgrass professional working in Minnesota, what thoughts or words pop into your head when you hear the name Dr. Brian Horgan? I see words like visionary, energetic, well-respected, idea guy, optimistic, intelligent, passionate, confident, and the list goes on and on. Let's just say the gods of fortune were smiling on the Minnesota Turfgrass Industry back in 2001 when the University of Minnesota brought him on board.

After completing his PhD work at the University of Illinois under the tutelage of Dr. Bruce Branham, he joined the University of Minnesota faculty. Dr. Horgan is currently an Associate Professor at the University of Minnesota and holds the title of Turfgrass Extension Specialist. His research interests revolve around nutrient fate and turfgrass water conservation. Specifically, he is interested in improving nitrogen and phosphorus fertilizer recommendations and gaining a better understanding of the fate of phosphorus in our environment. Dr. Horgan has spent the last five years researching turfgrass water conservation strategies utilizing new technologies, ET predictors and proper plant selection. He, along with Dr. Eric Watkins, conducts NTEP trials and works with alternative low-input turfgrass species.

Brian was the impetus behind the creation and development of TROE Center (Turfgrass Research, Outreach and Education) research facility on the University of Minnesota St. Paul campus. The creation of this research complex in 2003 put Minnesota Turfgrass research on the map. It is here that most of the research studies are conducted and where an annual Field Day is held to expose industry stakeholders to research in progress.



BRIAN HORGAN, Ph.D.
University of Minnesota

When the Minnesota legislature decided that our state should be the first in the nation to ban phosphorous fertilizer, Dr. Horgan, along with several members of MGCSA, stepped forward to work with the politicians. The end result was a golf course exemption clause in lieu of completing a training and certification program for golf course personnel. This certification program was designed and taught by Dr. Horgan. Because of this successful collaboration, Brian and the MGCSA received a rare recognition award from the Minnesota Department of Agriculture.

He was instrumental in creating a one-week academic course called the School of Turfgrass Management in collaboration with faculty at the University of Wisconsin-Madison. The course rotates annually between Madison and St. Paul and is well attended by assistants, grounds staff and anyone looking for a

solid background in basic Turfgrass management. When you talk to students that were taught, mentored, or advised by Brian, a common theme emerges. He is highly respected and held in high regard.

Because of the value of this cutting-edge research to day-to-day golf course operations, Brian is highly sought after for speaking engagements. Since joining the University of Minnesota faculty ten years ago, Brian has earned a reputation that is in high demand at educational gatherings around the world. He has presented across the USA, in Canada, Europe, Asia, Australia and South America. His cutting-edge research combined with his engaging, easy-going, thought-provoking teaching style keeps him very busy on the speaking circuit. When you attend a seminar taught by Brian, his passion and excitement for his work shines through. He genuinely loves what he does. He is truly global and we here in Minnesota could not ask for a better representative.

Consequently, as President of MGCSA, I am proud to recognize the incredible contributions made by Dr. Horgan in these short ten years. Rarely does an individual impact an industry to this level in such a short time period. It became evident that Dr. Horgan would be the perfect recipient for the MGCSA Presidents' Award (last presented in 2005). Therefore, in December 2010, at the annual MGCSA Awards Banquet, I had the honor of presenting the MGCSA President's Award to Dr. Brian Horgan in recognition of his vision, dedication and outstanding contributions to the Minnesota Golf Course Superintendents' profession and to the Minnesota Turfgrass Industry. Moreover, on top of all this, he has a rather impressive golf game. Dr. Brian Horgan truly is a Minnesota wonder.

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Thank you Dr. Brantley for your support over the years. The MGCSA wishes you the best at Michigan State.



*rian Horgan for
the last 18 years.
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State University*



18 Years at the University of Minnesota

A Final Interview with Dr. Brian Horgan, University of Minnesota Turfgrass Extension Specialist

Conducted by Matt Cavanaugh

March, 2001 MGCSA President Paul Eckhom CGCS delivers this message in Hole Notes:

“I am one of the luckiest guys in the turf business. I am the one who gets to announce to all of you that the University of Minnesota has successfully hired a Turfgrass Extension and Research Specialist. This has been in the works for over a year and a half and has finally come to a successful conclusion. Dr. Brian Horgan comes to us with a long list of credentials and was by far the best candidate. We were able to keep him from accepting job offers from at least five other Universities. This proves the commitment the “U” has to the turfgrass industry in Minnesota. We welcome Dr. Horgan and look forward to his arrival on July 1st.”

Why the University of Minnesota?

Brian:

“To be at this University, in this city, made all the sense to Cindy and me. Couple that with an industry that was hungry for relevant turfgrass programing and willingness to invest in it was a no brainer. I could have been a cog in a wheel at a bigger University or I could go and reinvent something and make something new at the University of Minnesota. I made the right choice!”

What do you remember about that first year?

Brian:

“I drove around the state that first year, meeting with any superintendent that would open their door, and just talked to them. I then had my first program that year on wetting agents. At the time there were really only a hand full of superintendents playing with wetting agents and I had each one of them do a

fifteen minute presentation at the annual conference with pictures and how they were using them. This was how I began to build a rapport with superintendents during the first years.”

2005, 2011, 2018 and 2019. Years with crown hydration to years with fairways that looked like glaciers were mowing through the course.”

I’ve always enjoyed your speaking style. What is your philosophy on speaking at educational events?

Brian:

“Get away from the podium and ask a question immediately. It’s all about getting people to talk in the first 15 minutes. That’s the key. Get out in front, make the audience feel comfortable.

I’m no different, I’m just here with some

information. You know me and I know you so let’s have a conversation. If I stay behind the podium all prim and proper, people are going to take that as I don’t want engagement. They’ll determine that I’m only here to give information and move on. I’ve always had the philosophy to ask and see what’s going on



What was the craziest stuff you saw visiting golf courses?

Brian:

“There were crazy winters that just decimated courses during my time. The most memorable years included

with individuals in the audience.”

How have things changed on the golf course side since 2001?

Brian:

“The willingness to be data driven has increased. The art of greenskeeping is still valuable, but the science side has caught up and those that are not willing to look at data are going to get left behind. That the job market has peaked is a big change. During and after the recession we saw a lot of people get out of the industry and we are not seeing young people come in now. The function and expectation of the properties has continued to exceed our ability to provide that product, given budgets, which has been that way since the day I started. “

For those who are now feeling guilty for not getting to know you, what are your five favorite movies?

Brian:

“Borne Series, Braveheart, The Fugitive, Good Will Hunting and War Games”

Favorite band or music?

Brian:

“Anything 70’s or 80’s. On satellite radio it would be classic vinyl or classic rewind”.

Favorite current TV show?

Brian:

“Discovery Channel stuff like ‘Deadliest Catch’ or the shows revolving around gold mining. Anything where they are out in the elements. I get a little dismayed with the gold stuff just because of what they are doing to the environment.”

What were your initial goals at the University of Minnesota?

Brian:

“Develop environmentally responsible turfgrass cultural systems. We wrote that in 2002. Don White and I were sitting at a table with Troy Carson and we had additional turf group members, John Powell and Carl Rosen. We brainstormed for an afternoon of what we wanted this program to be. This statement was cutting edge in 2002. If you pick out the words from there, I don’t know that we imagined how relevant that

would continue to be into the future. Technology and innovation will really drive our ability to be responsible, especially in the home turf situation.”

“Next was hiring Eric Watkins in breeding and genetics to continue developing this goal. Eric had a similar philosophy of alternative grasses and alternative species and how do we do better through breeding and genetics as our primary tool for resource conservation. Then it became whole systems. Environmentally responsible turfgrass cultural systems, it wasn’t just plot work. How do we get these practices to larger scale environments so that we can test them in the places in which others will start to believe that it can work? That “systems” word, which was initially not part of our thinking, then opened up the door to ‘The Science of the Green.’”

“I did not want a huge crop of graduate students. As the Turfgrass Extension Specialist, I wanted to be able to not be on campus. I wanted to be accessible to industry all the time and, during those first 15 years, that is what I did. Once we

built the program to a size where there were enough people and when Sam Bauer came on board too, that is when I started to focus on these bigger issues: trying to get the USGA partnership and getting the University to think differently about their assets.” Students that have gone through this program during my time that many of you likely know, are: John Sass, Troy Carson, Aaron Johnsen, Sam Bauer, Matt Cavanaugh, Josh Friell, Ryan Moy, Matt Olsonoski, Maggie Reiter and Ryan Schwab.”

“My peers around the country have always been jealous of the support the University and our program get from the industry. We have never had an issue where we felt that we could not fund a research center to a point where we could be competitive for grants. Eric Watkins was our best hire because he was not afraid to fail at writing grants and he did, but then he became very successful. We were/are a good team. Surrounding yourself with the best people and then letting them do their job has always been a key.”

Is TROE more or less than you

thought it would be?

Brian:

“TROE is a highly functional research center that is less than I expected it to be. That’s primarily because of where it is located. It’s a highly desirable UMN asset and we have fought for it. In the eighteen years that I have been here, I’ve had four legitimate battles for that land where I had to value all the research and assets we have out there, the active grants, the people that are associated with it and the income that comes from it. Then going back to the University and saying, ‘If you move us or if you take this land or use it for some other purpose, here is the cost for doing that’. TROE to me has enabled us to do a lot of the things we wanted to do.”

Why has this program been successful in the last eighteen years?

Brian:

“The staple to the success of the turf program has been the three prong approach. The tie of the Extension Educator (Sam Bauer’s old position) back to campus, doing applied research and writing grants,

but most importantly being available to the end user, whether a golf course or a homeowner. Then the Extension Specialist (Brian Horgan’s Position) overseeing and leading a research program that is affiliated with the teaching side (Eric Watkins’ Position) while Eric is also leading a research program. The three of us had similar goals and vision for the program.

“I wrote to the University during the first year, that if the University is not going to invest in the turf program appropriately, then why have it? If we are going to have a turf program, then let’s go for it and be a positive influence for the industry.”

“With two of the three prongs now vacant, the Extension Educator position (Sam Bauer’s old position) and now the Extension Specialist position (Brian’s), the politics involved with filling these two positions should be something the industry should pay attention to, be respectful to these politics, but also be vocal and the resources that have been invested by the industry to the university should be leveraged.”

“If you look back at Paul Eckholm’s statement in the March 2001 edition of Hole Note’s about the ‘Drive for the University’ initiative committing MGCSA dollars to the University of Minnesota he states, ‘The ‘U’ has committed to us (the MGCSA) and it is time we (the MGCSA) give something back. The industry, year after year since this statement, has provided this support and now we need to flip that sentence around. ‘The industry has committed to the

University and now it’s time for the University to hold up their side.’”

“With all sincerity, I am deeply grateful for all the MGCSA has done for the turfgrass program at the University of Minnesota. Don’t let off the gas now but be patient with the program as it evolves into something even better”.



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What Type of Impact Are You Making on the Environment?

by Mike McCall CGCS, Executive Director MetGCSA

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As most superintendents know well, our golf course management practices are perpetually under scrutiny . . . by local, state, and federal government agencies, the media, our communities, and our neighbors. And let's face it, we're an easy target. In recent years, words like "carbon footprint" and "sustainability" have become everyday sayings, making environmental concerns more commonplace than ever in our industry and many others.

The Met Area—particularly Westchester County and Nassau and Suffolk Counties on Long Island—are perennially deemed the highest pesticide users in New York State by the New York State Department of Environmental Conservation (NYSDEC).

How does the NYSDEC determine this? Believe it or not, those pesticide applicator reports you submit annually are being used to determine state pesticide use with the help of Cornell University. As of now, the summary data for the year 2013 is available in an NYSDEC report titled, "Final Annual Report for New York State Pesticide Sales and Applications 2013," and it's there for all to see on the NYSDEC website.

The issue with this data that I, and others, have maintained is that the quantity usage is based on only the weight or volume of the products being used, without any consideration given to the amount of active ingredient. While this information provides a large-scale picture for state officials, it's flawed in its ability to determine the toxicity of the applications, which I believe, is what we are all striving for.

For instance, a fertilizer combination product that contains Dimension would be calculated based on the pounds of fertilizer applied, even though only a small percentage of that fertilizer is actually a pesticide.

Most superintendents try to do the right thing when managing their

properties following an Integrated Pest Management (IPM) Program that either they have developed for their own facility or that was developed by someone else, and they've customized it and made it their own. Now another tool in our toolbox is gaining popularity to help turf managers properly select a product that will, first and foremost, work and, next, have the least negative impact on the environment or non-target organisms. That tool is the Environmental Impact Quotient (EIQ), a value based on a formula originally created to provide agricultural producers with data regarding the environmental and health impacts of their pesticide options so they could make better-informed decisions regarding their pesticide selection.

The Skinny on the EIQ

You may or may not have heard of the Environmental Impact Quotient, more commonly referred to as the EIQ. It's not a new term. The concept of the EIQ was developed in 1992 by researchers and IPM specialists Joe Kovach, Curt Petzoldt, Jim Degnil, and Jim Tette of Cornell University, as a means to measure or quantify the environmental impact or the risk pesticides may have on human health and non-target organisms with particular emphasis on apple production. Put in simpler terms, the EIQ is a way to figure out what product will have the lowest environmental impact, while still completing the target goal.

The EIQ has been successfully adopted by green industry professionals and used for 20 years on golf courses. "The EIQ continues to grow in popularity among turfgrass managers," notes Jennifer Grant, director of the New York State IPM Program at Cornell University. "They like having another tool in their tool box—a way to consider the environmental impact of a pesticide, while also considering the efficacy, cost, and need for resistance management," she adds.

The formula depicted in the box on the left shows Cornell's method for calculating and assigning an EIQ value to an active ingredient. The higher the EIQ value, the greater impact the product, or products, can have on non-target organisms or the environment. But a better metric of

environmental impact of a product depends on how much active ingredient (AI) is being used along with the rate applied.

The product's Field Use EIQ (FUEIQ) Rating takes the amount of AI into account, and is determined by multiplying the EIQ value by the rate of application and percent of active ingredient: FUEIQ = EIQ x Rate (LB/AC) x %AI. It's the FUEIQ Rating that provides a value that can be used to compare the impact of pesticide applications, and thereby help in product selection.

To determine the FUEIQ Rating for combination products, the EIQ value will first have to be calculated for each active ingredient. Often these combination products use a lower percentage of each active ingredient, so the EIQ will be lower than if each product were used separately at recommended rates.

The EIQ Equation

The formula for determining the EIQ value of individual pesticides is listed below and is the average of the farm worker, consumer, and ecological components.

$$EIQ = \{C[(DT*5)+(DT*P)] + [(C*((S+P)/2)*SY)+(L)] + [(F*R)+(D*((S+P)/2)*3)+(Z*P*3)+(B*P*5)]\} / 3$$

DT = dermal toxicity

C = chronic toxicity

SY = systemicity

F = fish toxicity

L = leaching potential

R = surface loss potential

D = bird toxicity

S = soil half-life

Z = bee toxicity

B = beneficial arthropod toxicity

P = plant surface half-life.

(Note: In the golf course world, the farm worker is the equivalent of the applicator and other course employees, and the consumer is the equivalent of the golfers.)

The Western Exposure Eagle Creek Golf Club Thank you Host Tom Wodash



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EIQ Field Use - Total Course F					
Application Date	Product Used	EPA No.	Target / Pest	Class H=Herbicide I=Insecticide F=Fungicide	MOA Resistance Class
9-Apr	Instrata	100-1231	Dollar Spot	F	M5
15-Apr	Proxy	432-1230	PGR		PGR
15-Apr	Primo Maxx	100-937	PGR		PGR
16-Apr	Shaws Acclepryn &	8378-72	ABW	I	28
16-Apr	Dimension		Crabgrass	H	3
26-Apr	Bensumec 4LF	2217-696	Crabgrass	H	8
26-Apr	Lambda GC	53883-244-66222	Hyperodes	I	3A
6-May	Concert II	100-1347	Dollar Spot	F	M5
			Dollar Spot	F	3
6-May	Primo Maxx	100-937	PGR		PGR
6-May	Lambda GC	53883-244-66222	Hyperodes	I	3A
20-May	Dimension 2EW	62719-542	Crabgrass	H	3
27-May	Primo Maxx	100-937	PGR		PGR
27-May	Provaunt	352-716	ABW	I	22A
4-Jun	Banner Maxx II	100-1326	Dollar Spot	F	3
4-Jun	Daconil Ultrex	50534-202-100	Dollar Spot	F	M5
4-Jun	Mec Amine-D	34704-239	Broad Leaf	H	4
			Broad Leaf	H	4
			Broad Leaf	H	4
10-Jun	Daconil Ultrex	50534-202-100	Dollar Spot	F	M5
10-Jun	Primo Maxx	100-937	PGR		PGR

The FUEIQ value is helpful in determining which of many similar products you might choose to apply on your course. If you were trying to control dollar spot, for instance, and both chlorothalonil (Daconil) and boscalid (Emerald) are products approved for treating or preventing dollar spot, then it might be in your best interest to select the product with the lower EIQ value, i.e., boscalid.

FUEIQ values, along with your knowledge of effectiveness, cost, and need for resistance management can help you to make the best product selection, when a pesticide is needed. The Cornell Guide for Commercial Turfgrass Management provides FUEIQ values along with the efficacy information and resistance management codes. It can be accessed free of charge on the Cornell Turfgrass website, <http://www.hort.cornell.edu/turf/guidelines.pdf>.

Active Ingredient	EIQ	%AI	Application Rate fl oz or oz/000	Field Use EIQ	Area Treated (1000 ft)	Area Treated (Acres)	Total Field Use EIQ
Chlorothalonil	37.40	29.90%	5.000	152.22	Greens	3.0	456.7
Ethephon	24.80	21.70%	4.800	70.33	Greens	3.0	211.0
Trinexepac	19.03	11.30%	0.125	0.73	Greens	3.0	2.2
Chlorantraniliprole	18.34	0.17%	82.720	6.90	FW&Rough	22.8	157.3
Dithiopyr	15.73	0.07%	82.720	2.37	FW&Rough	22.8	54.1
Bensulide	26.00	46.00%	5.000	162.81	Greens	3.0	488.4
Lamda Cyhalothrin	44.17	9.70%	0.227	2.65	Greens	3.2	8.5
Chlorothalonil	37.40	38.50%	5.000	196.01	Tees	3.0	588.0
Propiconazole	31.63	2.90%	5.000	12.49	Tees	3.0	37.5
Trinexepac	19.03	11.30%	0.125	0.73	Tees	3.0	2.2
Lamda Cyhalothrin	44.17	9.70%	0.227	2.65	Tees	3.2	8.5
Dithiopyr	15.73	24.00%	0.370	3.80	Rough	6.0	22.8
Trinexepac	19.03	11.30%	0.125	0.73	Greens	3.0	2.2
Indoxacarb	31.19	30.00%	0.275	7.01	Greens	2.5	17.5
Propiconazole	31.63	14.30%	2.900	35.71	Fairways	12.0	428.5
Chlorothalonil	37.40	82.50%	3.200	268.81	Fairways	13.6	3655.8
2,4-D	15.30	30.56%	1.000	12.73	Fairways	7.3	92.9
MCPP	15.33	8.17%	1.000	3.41	FW&Rough	7.3	24.9
Dicamba	25.33	2.77%	1.000	1.91	FW&Rough	7.3	13.9
Chlorothalonil	37.40	82.50%	3.000	252.01	Greens	3.6	907.2
Trinexepac	19.03	11.30%	0.125	0.73	Greens	3.0	2.2

Shortcomings of the EIQ Method

While the EIQ method makes sense on many levels, I would be remiss if I didn't tell you before going any further that even its most staunch supporters recognize there are a few flaws in the model.

For instance, the EIQ method's strength of distilling environmental risk into a single number is also one of its greatest weaknesses. Determining the weighting of any single component can skew the entire system one way or another. One of the biggest complaints I hear is the emphasis placed on the percentage of active ingredient and application rate.

Carl Schimenti of Cornell University summed it up nicely: "When you look at base EIQ values, they range from around 8 to 80, or a factor of 10. When you look at the amount of AI applied, it can vary from around .03 ozs./1,000 with something like Ecoguard, to about 7 ozs./1,000 with Ci-

vitae. Or a factor of 200! There is much more variability in the amount of product compared to the base EIQ values.

“Ultimately,” Schimenti continues, “this means that products with really high use rates (Civitas) or really low use rates (Ecoguard, trinex-epacethyl) ‘warp’ the model. In this respect, it feels like the EIQ does overweight the amount of AI being applied. It becomes ‘pounds on the ground, adjusted slightly for toxicity.’ That being said, if you are comparing two products that have similar use rates, that’s when the EIQ becomes extremely valuable.”

These shortcomings have not deterred Dr. Paul Koch of the University of Wisconsin-Madison from incorporating the EIQ method into his Common Ground Initiative where he is evaluating 20+ golf courses’ pesticide applications ranging from low- to high-budget operations. His goal is to develop a statewide environmental impact baseline and provide some type of incentive for golf courses to achieve levels below that threshold or, at the very minimum, to continually strive to reduce their individual

The image is a composite advertisement for Hartman Golf Course Construction & Renovation. It features a background photograph of a golf course with a green fairway, a sand trap, and trees with autumn foliage. Overlaid on the image is the company logo, which includes a stylized green tree icon to the left of the word "HARTMAN" in a large, serif font. Below "HARTMAN" is a purple swoosh and the text "Golf Course Construction & Renovation". To the right of the logo, the tagline "Quality since 1971..." is written in a red, cursive font. At the bottom left, the text "Specializing in..." is written in purple, followed by a list of services: "Bunkers • Tees • Laser Leveling • Green Drainage • Irrigation • Design • Pump Station Upgrades". At the bottom left, the address "8099 Bavaria Rd. Victoria, MN 55386" and phone number "952.443.2990" are listed. At the bottom right, the email "info@hartmancompanies.com" and website "www.hartmancompanies.com" are provided.

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course baselines. To determine that baseline, Koch is working with both the EIQ model and a simpler, but less sophisticated, Hazard Quotient model that relates only to the LD50.

Developing a pesticide impact metric is a complex matter that may

A Method to Measure the Environmental Impact of Pesticides, Table 2: Li

Action: IGR = insect growth regulator, PGR = plant growth regulator, PA = plant activator, CP = crop pro
F = fungicide, H = herbicide, Fum = Soil fumigant

EIQ Revision Date: Date of latest revision. Original = EIQ value from 1992 bulletin

Old EIQ Rating: EIQ value from original 1992 bulletin or from previous revision.

Missing Data: None=no missing data values, B= toxicity to beneficial insects, P=plant surface half life, Z= tox

Formula Symbols: DT = Acute dermal toxicity D = Toxicity to birds F = Toxicity to fish Z = Toxicity to bees L =
P = Plant surface health effects B = Toxicity to beneficials

Formulas			(Farm Worker+ Consumer+ Ecological)/3				C(DT*5)	C(DT*P)	
Common Name	Trade Name	Action	EIQ total	EIQ Rev Date	Old EIQ Rating	Missing Data	Applicator Effects	Picker Effects	
Various									
amitraz	Mitac	AC	25.17	Mar-09	23.30	P	22.50	4.50	
clofentezine	Apollo	AC	26.28	Mar-09	26.30	P	7.50	1.50	
methyl bromide	Brom-o-gas	AC	53.57	Mar-09	New	P	50.00	24.00	
chinomethionat (formerly oxythioquinox)	Joust	AC	29.44	Mar-09	44.40	P	9.50	3.61	
oxythioquinox (is now chinomethionat)	Joust	AC	29.44	Mar-09	44.40	P	9.50	3.61	
acequinocyl	Kanemite, Shuttle	AC	11.33	Jan-05	Original	C	5.00	1.00	
fenazaquin	Magister	AC	38.57	Mar-09	New	C, P	9.50	3.61	
fluacrypyrim	Titaron	AC	28.03	Mar-09	New	B,D,L,R,S,C,D	9.50	3.61	
metaldehyde	DeadlineBullets	AC	11.73	Mar-09	-	P	5.00	1.00	
tebufenpyrad	Comanche, Masai	AC	26.58	Mar-09	New	C,P,B	10.00	3.80	
tetradifon	Acimite, Amidion	AC	17.99	Mar-09	New	C,S	9.50	1.90	
diafenthuron	Pegasus	AC	31.90	Dec-08	20.33	P, B	5.00	1.90	
streptomycin	Agrimycin 17	Bac	45.00	Mar-09	18.70	None	40.50	25.11	
oxytetracycline (was terramycin)	Mycoshield	Bac	21.67	Mar-09	New	S,P,B	7.50	4.65	
Bacillus subtilis	Companion	BF	10.28	Mar-09	7.60		5.00	1.00	
coniothyrium minitans	Contans	BF	8.00	Apr-04	6.67	None	5.00	1.00	
hydrogen peroxide (dioxide)	Zerotol	BF	16.00	Apr-04	14.67	none	25.00	5.00	
kaolin clay	Surround	CP	8.00	Dec-02	8.00	None	5.00	1.00	
metam sodium	Woodfume	Fum	26.59	Mar-09	New	P	17.50	6.65	
dazomet	Basamid	Fum	13.17	Mar-09	2.70	none	7.50	1.50	

never be to everyone's liking. But in an era of big data, it is the use of these metrics that will allow us to make better decisions, notes Cornell's Dr. Frank Rossi. Instrumental in the development of New York State's BMP manual and honored recently with the GCSAA 2018 President's Award

Cost of Pesticides 2017

Protectant, BP = biopesticides, B = bactericide, AC = acaricide, I = insecticide



toxicity to bees, C=chronic health effects, R=runoff potential, L=leaching potential, S=soil residue half life
 L = Leaching potential R = Runoff potential S = Soil residue half life SY = Mode of action C = Chronic health effects

$C(DT*5)$ $C(DT*P)$	C^* $((S+P)/2)$ $*SY$	L	$C^*((S+P)/2)$ $*SY)+L$	(F*R)	$(D^*((S+P)$ $/2*3)$	$(Z*P*3)$	$(B*P*5)$ (Beneficial)+ (Plant 1/2L)	(D+B) (Bird)+ (Beneficial)	(Fish)+(Bird) +(Bee)+ (Beneficial)
Farm Worker	Consumer Effects	Grd H2O Leaching	Consumer + Leaching	Fish	Birds	Bee	Beneficials	Terrestrial	Ecology
27.00	1.50	1.00	2.50	25.00	3.00	3.00	15.00	21.00	46.00
9.00	3.00	1.00	4.00	25.00	30.00	3.00	7.85	40.85	65.85
74.00	5.40	5.00	10.40	1.00	40.50	7.20	27.60	75.30	76.30
13.11	4.66	5.00	9.66	5.00	7.35	5.70	47.50	60.55	65.55
13.11	4.66	5.00	9.66	5.00	7.35	5.70	47.50	60.55	65.55
6.00	1.00	1.00	2.00	15.00	3.00	3.00	5.00	11.00	26.00
13.11	4.66	1.00	5.66	25.00	7.35	17.10	47.50	71.95	96.95
13.11	3.99	2.00	5.99	5.76	6.30	17.10	35.82	59.22	64.98
6.00	6.00	3.00	9.00	3.00	6.00	3.00	8.20	17.20	20.20
13.80	2.90	1.00	3.90	25.00	4.35	17.10	15.58	37.03	62.03
11.40	3.33	1.00	4.33	25.00	5.25	3.00	5.00	13.25	38.25
6.90	1.45	1.00	2.45	25.00	4.35	28.50	28.50	61.35	86.35
65.61	21.87	3.60	25.47	5.44	8.26	10.23	20.00	38.49	43.93
12.15	4.05	1.00	5.05	5.00	8.10	9.30	25.42	42.82	47.82
6.00	2.00	1.00	3.00	5.00	6.00	3.00	7.85	16.85	21.85
6.00	1.00	5.00	6.00	1.00	3.00	3.00	5.00	11.00	12.00
30.00	1.00	5.00	6.00	1.00	3.00	3.00	5.00	11.00	12.00
6.00	1.00	1.00	2.00	5.00	3.00	3.00	5.00	11.00	16.00
24.15	5.08	3.00	8.08	9.00	4.35	5.70	28.50	38.55	47.55
9.00	1.50	3.00	4.50	15.00	3.00	3.00	5.00	11.00	26.00

for Environmental Stewardship, Dr. Rossi won't deny that the EIQ model could be enhanced, but even in its present form, he recognizes its value in determining—and managing—a course's environmental impact: "By far the best reason to try the EIQ method," he says, "is to get a sense of how your decisions for managing pests accumulates into measurable (certainly arguable) risk."

Environmental Impact Calculations Made Easy

Provided these shortcomings in the current EIQ method haven't deterred you from forging ahead, you're probably wondering, "How the heck am I going to figure all this out?" Not to worry. Much of the hard work has already been done for you. The EIQ for just about every AI approved for use in New York State can be found on an Excel spreadsheet, right here, on Cornell University's website: <https://nysipm.cornell.edu/eiq/list-pesticide-active-ingredient-eiq-values>.

This comprehensive spreadsheet (see example on previous pages) includes the environmental impact that various AIs have on bees, fish, birds, and beneficial insects, as well as on such factors as chronic health, dermal toxicity, and numerous others. The result is a single number describing the EIQ of a pesticide's active ingredient.



The list is updated fairly regularly, so if a new product comes on the market, check back at that link to see if it's been added to the list. What's interesting about this database is that you can go in and see which component(s) of the active ingredient is causing an elevated EIQ value. For instance, many are aware of the issues surrounding imidacloprid (Merit) and its possible correlation with Bee Colony Collapse Disorder. If you look at the bee component of imidacloprid within the table, you will see that it has one of the highest values with respect to bee toxicity compared to most others. This spreadsheet will allow you to see why you should or shouldn't use certain products under certain circumstances.

In addition to providing EIQ values for almost every AI on the market, Cornell has developed a calculator to help you determine your Field Use EIQ Rating for various formulated pesticide products. All you need is the rate of application and percent of active ingredient in the specific product you're considering purchasing or using. Then plug that information into Cornell's calculator and, voilá, you have your Field Use EIQ. You'll find the calculator by logging on to <https://nysipm.cornell.edu/eiq/calculator-field-use-eiq>.

You can also set up a spreadsheet to track your pesticide applications and their EIQ, or request an EIQ spreadsheet designed at Cornell University specifically for golf courses, by emailing css223@cornell.edu.

Making your EIQ calculations simpler yet are software programs that will do every bit of work for you as you enter your normal pesticide application data. One such program has been developed by Met members and Playbooks for Golf's cofounders Greg Wojick and Matt Leverich, who describe their EIQ software as a turnkey solution to EIQ calculation and reporting. The program synthesizes all the product applications, providing a summation of risks/toxicity for the entire property over a given period, typically a year.

The EIQ in Action

Recently, it's seemed that calculating products' EIQ has gained favor as a tool in selecting pesticides that achieve the desired objective with the

lowest impact on the environment. In fact, several recent Arthur P. Weber Environmental Award candidates pointed out on their award applications that they have made the EIQ an integral part of their turf management program.

At the MGA Green Chairman Seminar on March 14, one of those candidates, Bethpage State Park, was awarded the 2018 MGA Arthur P. Weber Environmental Leaders in Golf Award. Director of Agronomy Andrew Wilson accepted the award on behalf of Bethpage, which has been using the EIQ for nearly 10 years with great effect. (See sidebar, page XX.)

“The attraction is the simple number where the EIQ can help us evaluate choices among products,” explains Wilson. “We go by efficacy first, then look at EIQ while checking FRAC codes to rotate chemistries.

“In addition, Wilson notes, “the data behind getting that base EIQ number is very meaningful. For those so inclined, they can look at leaching potential and fish toxicity risk in the raw data if they have surface water bodies. Or they can check out pollinator risk if they have large pollinator areas.”

Putting the EIQ to Work on Your Course

If making use of the EIQ method on your course sounds like more trouble than it's worth, think again. Because we're already required to keep pesticide application records, the work is mostly done. If you're using Excel to track your products, then all you need to do is add a few cells (some that require formulas): EIQ, % Active Ingredient, Field Use Rating, # Acres Treated, Total Field Use EIQ, including the FRAC number can be useful for rotating products as well.

The next step is to add the area (acreage) you are treating. Obviously, the more acreage you spray, the greater the impact on the environment you will have. Very simply, you take the Field Use EIQ Rating and multiply by the number of acres treated to get the Total Field Use EIQ Acres. Finally, you add up all of the Total Field Use EIQ Acre values for each application and then you have your Total Field Use EIQ Acres, which

The EIQ at Work in Bethpage State Park Study:

In their 2009 handbook, *Reducing Chemical Use on Golf Course Turf: Redefining IPM*, Dr. Frank Rossi, Dr. Jennifer Grant, and Bob Portmess detail how the EIQ was implemented during the study of Bethpage State Park to compare the environmental risk of the various pest management systems.

The researchers noted that the EIQ ranks pesticides using a composite evaluation of toxicity and exposure factors to aide in the selection of products with the least environmental impact. The Field Use EIQ can also be used to compare management approaches. In the Bethpage study, greens managed under IPM or biologically based systems had 50 to 95 percent less environmental impact over the course of a season than conventionally managed greens.

Nine years later, the researchers felt their work was well worth the effort. The quality of the IPM-managed areas equaled that of conventional pest management systems, and what's more, annual satisfaction surveys have shown that golfers did not perceive a difference in the quality of IPM-managed putting greens.

If you'd like to read more about the particulars of this study, you can order a free copy of Cornell's handbook at https://cpb-use1.wpmucdn.com/blogs.cornell.edu/dist/6/5969/files/2015/03/Cornell_Reduced_Chemical_Manual_2012-19w8a2g.pdf.

then gives you a sense of the impact your golf course is having on the environment.

The example below shows what your application record might look like. Through April, May, and June their Total Field Use Acres amounted to 7,182.3. Ultimately, this course ended up with a Total Field Use Acres value of 26,673, for the year (not pictured), which compared to many public and private courses is relatively low but much higher than the average of the New York State-owned golf course.

To give you a frame of reference, a few years ago Cornell provided me with the following values for Total Field Use EIQ Acres for both public and private courses with varied maintenance regimes. As you can see, the values vary depending on the level of conditioning required, with the Private Country Club hosting the professional event racking up the highest value for Total Field Use EIQ Acres in a year:

	2013	2017
Private Country Club hosting professional event	94,900	not available
Private Country Club	58,002	37,750
Public Daily Fee Course (well maintained)	30,797	not available
Average of all New York State-Owned Golf Courses	9,000	5,757

So, if you're looking to lower the EIQ on your course, it only makes sense that you look first at the largest areas that you treat on a regular basis, like your fairways or primary rough. The larger the area, after all, the bigger the impact that reducing the EIQ values of your chosen sprays will have.

To get started, Jeff Carlson, the superintendent at the Vineyard Club on Martha's Vineyard, who is well versed in operating with fewer chemical applications, suggests identifying your best fairway—the one with few trees, full sun, and good drainage—and then letting it go as long as pos-

sible.

“You’ll be surprised at how few inputs will be required,” says Carlson, who, managing a course on the Vineyard, has plenty of experience operating with limited pest and disease treatment options.

If the untreated fairway begins to look a little less pristine than the others, just be patient, but if you feel it warrants mentioning to your Green Committee, be sure to emphasize that you are one of a number of superintendents taking a lead role in the initiative to reduce the impact your course is having on the environment. And of course, adds Carlson, “if you’re close to reaching your damage threshold, you always have the option of treating the fairway.”

In the Final Evaluation

The EIQ method of pesticide selection is just another tool we have at our disposal to support our efforts to adopt “best management practices” on our golf courses. While admittedly not perfect, making use of a method like the Environmental Impact Quotient is a step in the right direction in encouraging superintendents to take a closer look at the pesticides they use on their courses and the potential environmental impact they may present.

If you visit the New York State Best Management Practices for Golf Courses website, <http://nysgolfbmp.cals.cornell.edu/>, you will find additional information about the EIQ and other pesticide selection methods.

How many times have you heard the saying, “You can’t manage what you can’t measure?” MetGCSA professionals are great at measuring myriad variables to manage and maintain exceptional playing surfaces—moisture levels, fertility and pesticide inputs, topdressing volumes, and firmness to name several. Now is the time to rise to the next level and work toward better managing and measuring the environmental risk on our courses. The EIQ method is a good way to start.

Mike McCall is the executive director of the MetGCSA and managing member of the McCall Management Group, LLC.

Research Partnership in Practice; MGCSA, WGCSA and GCSAA: Dollar Spot Control Using Urea and Iron Sulfate

Chase Straw and Brian Horgan- University of Minnesota

Kurt Hockemeyer, Doug Soldat and Paul Koch University of Wisconsin – Madison

Dollar spot is the most economically important disease of golf course turfgrass and insufficient cultural control measures have led to a heavy reliance on repeated use of fungicides. Iron sulfate (FeSO_4) has been used for decades in the turfgrass industry for its ability to improve turfgrass color (Reams, 2013). Recent research out of Oregon State showed that FeSO_4 can provide excellent control of *Microdochium* patch when applied at regular 2-week intervals (Mattox et al., 2017). In addition, researchers out of Virginia Tech demonstrated that FeSO_4 can also provide significant reductions in dollar spot on a creeping bentgrass putting green when applied at high rates (1 lb/1000 ft²) every 2 weeks (McCall et al., 2017). However, in both cases the FeSO_4 injured the putting surfaces to an unacceptable level after repeated applications. The objectives of this study are to (1) determine the impact of FeSO_4 and urea, both alone and applied as a tank mixture, on the development of dollar spot and (2) identify the appropriate reapplication interval and water volume that provides effective dollar spot control and optimal turf quality.

Study Design

Separate studies were conducted for each objective listed above, and both studies were replicated at the O. J. Noer Turfgrass Research and Education Facility in Madison, WI and Minnesota Valley CC in Bloomington, MN. All WI treatments were initiated on May 17th and all MN treatments were initiated on May 23rd and subsequent applications were made at 7, 14, 28, or 42-day intervals. A full list of treatments for both studies can be found in Table 1 and Table 2.

FeSO₄ + Urea – Minneapolis, MN

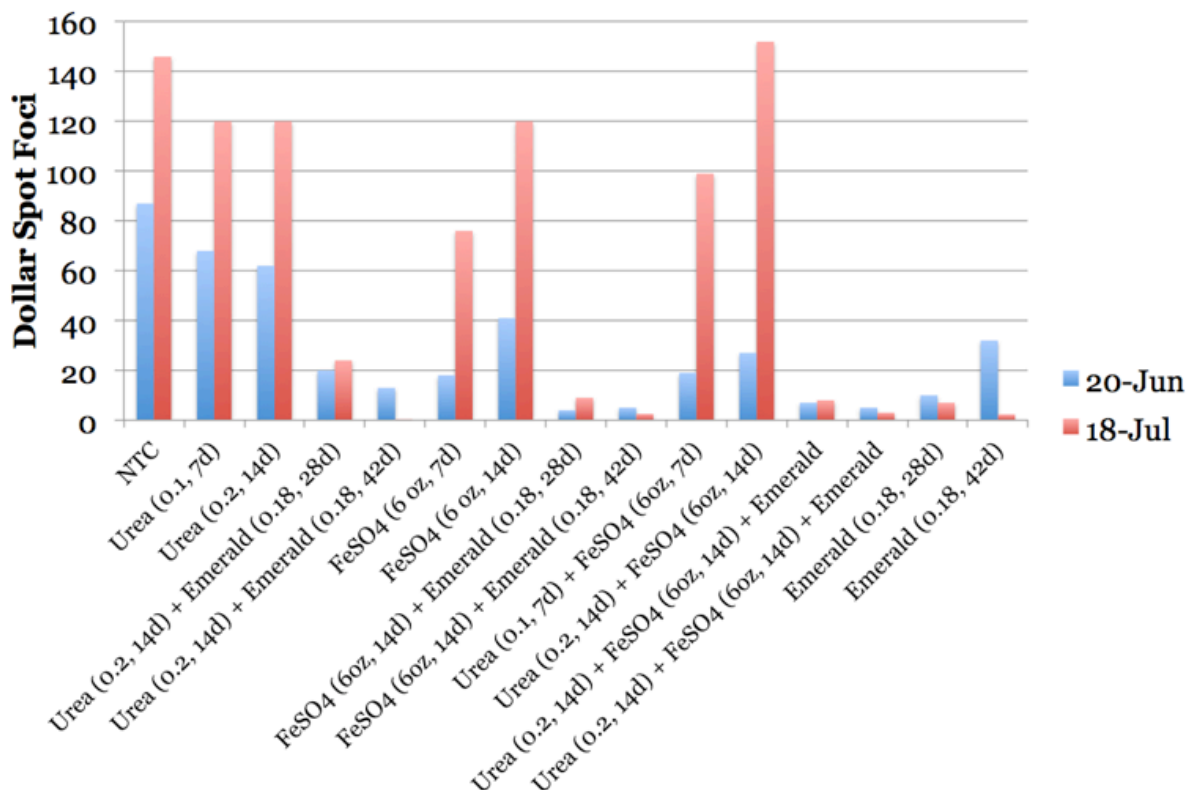


Figure 1. FeSO₄ and urea combinations for dollar spot control during 2018 at Minnesota Valley CC in Bloomington, MN.

Year 1 Results

Objective 1. Treatments containing iron sulfate generally reduced dollar spot relative to the non-treated control at both locations (Figure 1). Iron sulfate applied at a 7-day interval was much more effective compared to a 14-day interval (Figure 2). Urea, alone or in combination with other products, was not consistently effective at reducing dollar spot. Iron sulfate mixed with Emerald was extremely effective at suppressing dollar spot at the Minnesota location, however Emerald did not effectively control dollar spot at the Wisconsin site. The poor control provided in Wisconsin may be an indication of fungicide resistance to Emerald, which has been repeatedly used at the research facility over many years.

Objective 2. At both sites there was a clear dose response within the 7-day reapplication interval where higher rates of iron sulfate resulted in less dollar spot (Figure 3). The greatest dollar spot reduction was provid-



Figure 2. Impact of iron sulfate vs non-treated turf at the OJ Noer Turf grass Research Facility in Madison, WI on July 18th, 2018.

ed by iron sulfate applied at 12 fl oz/1000 ft² every 7 days, but this resulted in a very dark color that may be undesirable for superintendents. No strong influence of water volume on dollar spot severity was observed.

Summary

Iron sulfate provided significant suppression of dollar spot in the first year of this 2-year study at sites in both Wisconsin and Minnesota. The 7-day reapplication interval was almost always more effective than the 14-day interval, suggesting that lower rates at shorter intervals is a more effective iron sulfate use strategy than higher rates at longer intervals. The urea treatments in this study did not consistently reduce dollar spot. The study will be repeated at both locations in Year 2 but the fungicide treatment will be changed to account for the possibility of fungicide resistance at the Wisconsin research station.

Mattox, C. M., Kowalewski, A., McDonald, B., Lambrinos, J. G., Daviscourt,

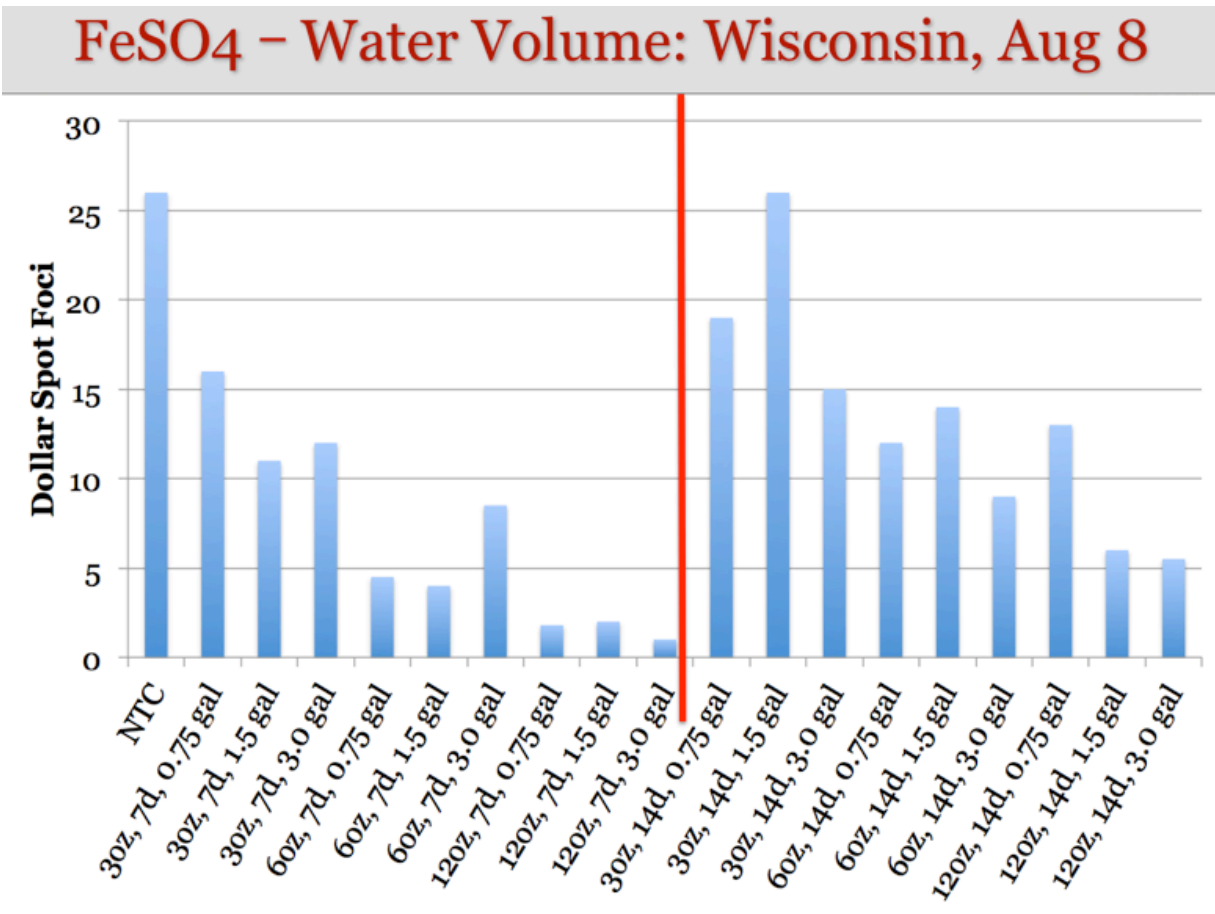
Treatment	Rate	Application Interval
1 Non-treated control		
2 Urea	0.1 lb N/1000ft ²	7 day
3 Urea	0.2 lb N/1000ft ²	14 day
4 Urea	0.2 lb N/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	28 day
5 Urea	0.2 lb N/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	42 day
6 Iron Sulfate	6 oz/1000ft ²	7 day
7 Iron Sulfate	6 oz/1000ft ²	14 day
8 Iron Sulfate	6 oz/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	28 day
9 Iron Sulfate	6 oz/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	42 day
10 Urea	0.1 lb N/1000ft ²	7 day
Iron Sulfate	6 oz/1000ft ²	
11 Urea	0.2 lb N/1000ft ²	14 day
Iron Sulfate	6 oz/1000ft ²	
12 Urea	0.2 lb N/1000ft ²	14 day
Iron Sulfate	6 oz/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	28 day
13 Urea	0.2 lb N/1000ft ²	14 day
Iron Sulfate	6 oz/1000ft ²	14 day
Emerald	0.18 oz/1000ft ²	42 day
14 Emerald	0.18 oz/1000ft ²	28 day
15 Emerald	0.18 oz/1000ft ²	42 day

Table 1. Treatment list for the iron sulfate-urea study described in Objective 1.

Table 2. Treatment list for the iron sulfate-water volume study described in Objective 2.

Treatment	Rate	Application Interval	Water Volume
1 Non-treated control			
2 Iron Sulfate	3 oz/1000 ft ²	7 day	0.75 gal/1000 ft ²
3 Iron Sulfate	3 oz/1000 ft ²	7 day	1.5 gal/1000 ft ²
4 Iron Sulfate	3 oz/1000 ft ²	7 day	3.0 gal/ 1000 ft ²
5 Iron Sulfate	6 oz/1000 ft ²	7 day	0.75 gal/1000 ft ²
6 Iron Sulfate	6 oz/1000 ft ²	7 day	1.5 gal/1000 ft ²
7 Iron Sulfate	6 oz/1000 ft ²	7 day	3.0 gal/ 1000 ft ²
8 Iron Sulfate	12 oz/1000 ft ²	7 day	0.75 gal/1000 ft ²
9 Iron Sulfate	12 oz/1000 ft ²	7 day	1.5 gal/1000 ft ²
10 Iron Sulfate	12 oz/1000 ft ²	7 day	3.0 gal/ 1000 ft ²
11 Iron Sulfate	3 oz/1000 ft ²	14 day	0.75 gal/1000 ft ²
12 Iron Sulfate	3 oz/1000 ft ²	14 day	1.5 gal/1000 ft ²
13 Iron Sulfate	3 oz/1000 ft ²	14 day	3.0 gal/ 1000 ft ²
14 Iron Sulfate	6 oz/1000 ft ²	14 day	0.75 gal/1000 ft ²
15 Iron Sulfate	6 oz/1000 ft ²	14 day	1.5 gal/1000 ft ²
16 Iron Sulfate	6 oz/1000 ft ²	14 day	3.0 gal/ 1000 ft ²
17 Iron Sulfate	12 oz/1000 ft ²	14 day	0.75 gal/1000 ft ²
18 Iron Sulfate	12 oz/1000 ft ²	14 day	1.5 gal/1000 ft ²
19 Iron Sulfate	12 oz/1000 ft ²	14 day	3.0 gal/ 1000 ft ²

Figure 3. Water volume, reapplication interval, and FeSO₄ rate impacts on dollar spot control at the OJ Noer Turfgrass Research Facility in 2018.



References:

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The preceding study was initiated by partnering the MGCSA, WGCSA and GCSAA to pool resources and generate applicable information.

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declan 2nd grade

interviewed by matt cavanaugh

adjective

insensitive to criticism or insults.

“you have to be thick-skinned to work in the turf industry”

synonyms: insensitive, unfeeling, tough, hardened, callous.

Several times a week I'll have someone at the golf course, be it a paying customer or an employee of the golf course, come up to me with a suggestion of how to make something better or an issue they have seen on the course. I tend to get pretty annoyed by this because in all most every single case I have already thought of the idea or I'm already aware of the issue they have brought up. After all, it is my job so see these things and I take a lot of pride in making the course the best I can with what I have. Like many of you we have a priority list. Cutting up the tree that just fell over because of some high winds will jump up the priority list over removing a few weeds at the first tee or putting some water in the ball washer on 17. However, I have to realize that most of the time people are just trying to help and they are not saying “hey dummy, why aren't you taking care of the weeds at the first tee?” I also have to be a little more humble and understand that I may not see everything and thus, we don't know what we don't know and you may need to be thick-skinned to hear it.

The one simple thick-skinned question:

Declan, you visit with and have many conversations with golf course superintendents and assistants. Based on the current

facts, research and knowledge, what is one thing you see that we as turfgrass managers could change to help improve turfgrass decisions?

Declan: *“You should cut more grass. So like, when you cut it in the morning and then it gets to the afternoon, you should cut it again.”*

thick-skinned: There are a lot of golfers out there in the afternoon. How would I be able to mow again?

Declan: *“When the golfers are doing lunch, you could just eat lunch faster and go mow the grass again.”*

thick-skinned: What if the golfers don't eat lunch?

Declan: *“Then you go mow in a different spot. Just keep moving around.”*

thick-skinned: How will mowing again in the afternoon benefit the golf course?

Declan: *“What does benefit mean?”*

thick-skinned: How will it make the golf course better?

Declan: *“So, it will make the grass more smooth and I bet golfers like that.”*

thick-skinned: What would you do if you were a golfer and there were golf course workers working around you?

Declan: *"I'd say, can you please go work somewhere else. I'd say it in a nice way though to be polite."*

thick-skinned: What if we only mowed in the morning? What do you think the problem would be.

Declan: *"The grass would get too tall and then the geese would eat the grass and poop all over your golf course."*

thick-skinned: What would you do to keep the geese off the golf course?

Declan: *"I'd laser beam them in the eye."*

What is the best way to clean up the goose poop?

Declan: *"So, I would pick the poop up and slide something under it. I'd then wrap it up and throw it in the garbage. I really don't have any more ideas."*

I have a few people that I try to avoid on the golf course because I know that anytime they want to talk they have something that they want me to fix. However, when they do catch up to me I try my best to listen, most of the time. Which reminds me, I have to go apologize to someone for driving away from them mid-sentence because I didn't want to hear

what they were going to say. I suggest you treat these individuals like a second grader because a second grader doesn't know what we do all day and I suspect they are only trying to help. Just like that golfer or fellow employee is.



Declan is second grader at Fernbrook middle school. Declan can't be reached because he has no phone, email account or Twitter handle.

Matt Cavanaugh is an Assistant Superintendent at Rush Creek Golf Club in Maple Grove, MN.

***Have an idea for a great
thick-skinned interview?
Contact Matt Cavanaugh***

In Bounds

by Jack MacKenzie, CGCS

In 1961, the University of Minnesota hired a young agronomist to expand upon the horticultural program instructing landscape design, nursery management and of most importance, turfgrass science. Dr. Don White spent 45 years vigorously growing a nationally recognized turfgrass program, passionately propagating a commercially viable turfgrass variety and of most importance to the Minnesota Golf Course Superintendents Association, developing and graduating many of the brightest golf course superintendents in the United States.

Dr. White's leadership served the industry well at a time when talented fine turfgrass managers were in high demand and destinations for a complete education limited. Take a moment and reflect upon the incredible talent Dr. White cultivated and distributed in the upper midwest; the number too great to list.

After four and a half decades, retirement beckoned and "DB" was tasked with finding his own replacement. Through an extensive process, and with great golf course industry support, the University of Minnesota hired Dr. Brian Horgan to continue Dr. White's successes. Challenges and opportunities awaited the young turfgrass extension specialist.



Golf's perceived future popularity and ensuing buildup in courses and professional schools, and thus corresponding explosion of motivated turfgrass professionals was on the precipice of an economic adjustment. Unfortunately, the prognostication espoused by the National Golf Foundation, combined with a burst in the country's monetary bubble, collapsed the potential of

growing the UMN as a destination for churning out many more golf course superintendents.

Not to be daunted, Dr. Horgan, whose focus was the fate and transport of pesticides and nutrients, water conservation strategies and low-

input turfgrass systems, took up the cause of creating a world class turfgrass research destination located upon the St. Paul Campus. The twelve acre plot



soon became home for over 50,000 square feet of putting green for experiments, a sloped fairway section built with lysimeter equipment to test for runoff chemistries, a rain out shelter for drought studies, huge plots used for National Turfgrass Evaluation and Performance trials and the potential for any studies industry wished to have conducted.

The creation of the Turfgrass Research Outreach and Education Center, TROE for short, established the University of Minnesota as the “go-to” destination for unbiased turfgrass studies in the upper Midwest. Dr. Horgan took full advantage of this platform and soon generated

many studies to benefit turf managers throughout the world. Since 2003, literally hundreds of scientific projects have been com-

pleted at the TROE, with countless peer reviewed publications, 24 in the year 2010 alone.

Utilizing the TROE Center to his professional advantage, Dr. Horgan soon became a highly demanded international presenter with a focus on nutrient management and sustainable turf. Although the Minnesota Golf Course Superintendents

Association didn't have proprietary rights of Brian, he was ever available to provide extension services to the membership upon request. "Our guy" developed into a world wide commodity. Over the last 18 years Brian continued Dr. White's tradition of cultivating professional turfgrass scientists as well.

Appreciating the opportunity for an even grander turfgrass research destination, one that encompassed the Les Bolstad Golf Course, creating over 150 acres of property for mega-studies, Brian developed and supported the Science of the Green initiative and a long-term UMN/USGA partnership. Re-focused, yet still industry-centric, Dr. Horgan made it a point to retain an energetic, educated and responsive turf

professional to pick up the extension workload at the UMN as he promoted the upscale research destination. Strategically hired, Sam Bauer was the perfect matchup to

continue Brian's extension services.

Alas, an outstanding professional opportunity in Brian's home state of Michigan presented itself this summer and he will soon be departing for

Michigan State University.

For almost two decades Dr. Brian Horgan has carried the Minnesota turfgrass extension banner with pride, dedication, energy, optimism and resiliency. During a time of sustainability concerns, both environmentally and professionally, Brian has been present to brace the golf



course management industry with recommendations, research and a list of successful and educated turf management professionals.

Having known Brian during his tenure as the MGCSA turf guru, it has been my pleasure to get to know him beyond “grass”. Along with many, I claim Brian to be a good professional friend and confidant. Like Dr. White before him, he has been a pillar throughout my career. Our shared thread of personal commonalities bring vigor to our conversations whenever we spend time

together. Brian, your friendship has been greatly appreciated.

On behalf of the Minnesota Golf Course Superintendents Association, thank you Dr. Brian Horgan for your relentless dedication to our industry. The legacy left in your wake will live on in Minnesota for generations and your impact will continue to be felt worldwide in the turf industry. We wish you well as you write the next chapters of your professional career and family adventures.

