experiment should be carried out.

For these reasons, I thought that it is time for us to look up a turfgrass textbook collecting dust from a bookshelf and refresh our memory on this old friend. Rough bluegrass is one of over 200 *Poa* species. The most widely utilized *Poa* species are Kentucky bluegrass (*Poa pratensis* L.), Canada bluegrass (*Poa compressa* L.), Supina bluegrass (*Poa supina* Schrad.), and Annual bluegrass (*Poa annua* L.). *Poa trivialis* is a perennial, stoloniferous grass just like creeping bentgrass, that appears in dense, yellow-green patches and adapts well to wet, shaded areas. Therefore, rough bluegrass has been used as a desirable turfgrass for those places. On the other hand, it is extremely sensitive to dry and hot weather condition as well as heavy traffic probably due to its shallow root system.

A number of distinct characteristics, which differentiate rough bluegrass from other *Poa* species are its fine texture, shiny, greenish-yellow leaves, high shoot density, and aboveground, creeping stolons. Furthermore, certain morphological traits such as a larger ligule and a more scabrous leaf sheath are characteristics in rough bluegrass differentiating it from Kentucky bluegrass.

In addition to the fact that this grass is susceptible to summer stresses, rough bluegrass is also extremely susceptible to brown patch, leaf spot, and dollar spot. In some cases, other diseases such as snow molds, Pythium blight, summer patch, rust, and powdery mildew can become a problem.

Surprisingly, rough bluegrass is very popular for winter overseeding of dormant bermudagrass greens, in warm and humid regions of the south. Because of the popularity, a number of research papers on rough bluegrass have been published. In recent years, researchers from Clemson University carried out an interesting experiment to answer a question, "The effect of fungicides on rough bluegrass germination and seedling development." Two fungicides, fenarimol (Rubigan) and cyproconazole have shown inhibitory effects on seedling establishment consistently in field and *in vitro* studies. Little or no noticeable effects on seed germination and seedling development were observed using iprodione, chlorothalonil WS, chlorothalonil Zn, mefanoxam, and azoxystrobin.

The only cultural management practices to limit the spread of rough bluegrass on golf courses is to avoid persistently moist soils, apply heavy traffic, and ensure only high quality seed mixtures are used. Rough bluegrass is sometimes a contaminant in seed production fields and, once it's started in a favorable environment, is virtually impossible to eradicate without chemical controls. The trick is to identify infestations early while the patches are small and few in number. If left untreated, new patches will develop as stolons are moved around by equipment and existing patches may grow larger. No selective chemicals are labeled for rough bluegrass control, requiring non-selective herbicides such as glyphosate (Roundup). Due to the stoloniferous growth habit of the grass, more than one application may sometimes be required to completely kill the plants. Herbicide applications should only be made when the grass is green and actively growing. Spot treatments with non-selective herbicides will kill all the grass in the treated area so be prepared for some comments from the golfers. Use only high quality, certified seed when replanting areas after the rough bluegrass has been eradicated.

References

Beard, J.B. 1973. Turfgrass: science and culture. Pages 63-65.

Camberato, J.J., S.B. Martin, and A.V. Turner. 2001. Fungicides affect rough bluegrass germination and seedling development. International Turfgrass Society Research Journal. Vol. 9, pages 649-654.

Warren L.S. 2003. Lawn maintenance use of plant growth regulators to reduce mowing. North Carolina Turfgrass. Pages 14-15.

mti DISTRIBUTING

EVERYTHING YOU NEED FOR YOUR BEST SEASON EVER!

TORO®

Toro Reelmaster® 5500-D

A lightweight fairway mower that's agile and easy on turf, yet has the power and cutting capacity to get the toughest jobs done.

Toro Workman® 2100

This is a serious piece of machinery! It's a hard worker that does what you demand of it, and then comes back for more.

Toro 800S® Sprinklers

The Toro 800S® series sprinklers are enhanced with new technology that defines reliability, durability, performance and the lowest cost of ownership.

For all of these great solutions and more, contact MTI Distributing, the Authorized Toro Distributor for western Wisconsin

4830 Azelia Avenue N #100
Brooklyn Center, MN 55429
763-592-5600 800-362-3665
www.mtidistributing.com

Recently Labeled Fungicides Add Tools for Resistance Management

By Steve Abler and Dr. Geunhwa Jung, *Turfgrass Diagnostic Lab, Department of Plant Pathology, University of Wisconsin-Madison*

Now that the growing season has come to an end, many turfgrass managers are turning their attention to next year's budget and fungicide program. Within the last two years, four fungicides with novel active ingredients have been labeled for use on turfgrasses. Important considerations when selecting fungicides for disease control programs are the fungicide's efficacy, longevity, cost, formulation, topical mode of action, biochemical mode of action, and chemical class. Three of the four new fungicides belong to chemical classes that have not previously been used on turfgrasses. Since rotating fungicides from different chemical classes is important for resistance management, these new fungicides may become important tools for turfgrass managers as more and more chemicals are losing EPA registration. The trade names of the fungicides and the diseases that they are labeled to control are listed in the table below.

Medallion®

Medallion® is marketed by Syngenta Professional Products. Medallion® is formulated as a 50% wettable powder that is packaged in five-ounce water soluble packets. The label rate for turfgrass diseases is between 0.20 and 0.50 oz./M with a maximum use rate of 1.5 oz./M per year. The active ingredient is fludioxonil which is the only member of the phenylpyrrole chemical class labeled for turfgrasses. Fludioxonil is a contact fungicide that has a single-site biochemical mode of action which acts by disrupting plasma membranes and amino acid uptake in the target fungi. Medallion® is labeled for the preventive control of seven diseases that are incited by ascomycetes and basidiomycetes (see table on page 24).

Recently Labeled Fungicides & Diseases They are Labeled to Control

DISEASE	Emerald®	Endorse®	Insignia®	Medallion®
Anthracnose		X	X	
Bentgrass Dead Spot	X		X	X
Fairy Ring			X	
Gray Leaf Spot		X*	X	
Leaf Spot		X	X	X
Melting Out		X	X	
Microdochium Patch		X	X	X
Pink Patch			X	
Powdery Mildew			X	
Pythium Blight			X	
Rapid Blight			X	
Red Thread		X	X	
Rhizoctonia Brown Patch		X	X	X
Rhizoctonia Yellow Patch		X		X
Rust			X	
Sclerotinia Dollar Spot	X		X*	
Summer Patch			X	X
Take-all Patch			X	
Typhula Blight		X	X	X

* labeled for suppression but not for control

Endorse®

Endorse® is formulated as a 2.5% wettable powder and is marketed by Cleary Chemical Corporation and packaged in 1.1 pound water soluble packages. The label rate for turfgrass diseases is 4.0 oz./M. The active ingredient of Endorse® is the antibiotic polyoxin D which is in the polyoxin chemical class. Although polyoxins have been used to control rice diseases since the 1960's, polyoxin D is the first chemical in this class to be labeled for turfgrasses. Polyoxin D is a localized penetrant that inhibits chitin (an important cell wall component of many fungi) biosynthesis. Since this fungicide has a single-site mode of action, there is a moderate risk of pathogens developing resistance to the active ingredient. Endorse is labeled for nine diseases of turfgrasses that are incited by ascomycetes and basidiomycetes (see table) and is restricted from use on sod and turfgrasses grown for seed.

Emerald®

Emerald® is formulated as a 70% water dispersible granule and is marketed by BASF Professional Turf. The label rate for turfgrass diseases is between 0.13 and 0.18 oz./M. The active ingredient of Emerald® is boscalid which is only member of the anilide chemical class to be labeled for use on turfgrasses. Boscalid is an acropetal penetrant which inhibits the cellular respiration of the target fungi. Since this fungicide has a single-site mode of action, there is a moderate risk of pathogens developing resistance to the active ingre-

dient. Emerald® is labeled for Sclerotinia dollar spot and bentgrass dead spot (both ascomycetes). This fungicide is currently only labeled for use on golf course turf.

Insignia®

Insignia® is formulated as a 20% water dispersible granule and is marketed by BASF Professional Turf. The label rate for turfgrass diseases is between 0.5 and 0.9 oz./M. The active ingredient of Insignia® is pyraclostrobin, which like azoxystrobin (Heritage®) and trifloxystrobin (Compass®) are members of the strobilurin chemical class. Pyraclostrobin is a localized penetrant which inhibits cellular respiration of target fungi. Since resistance to other fungicides in this chemical class with the same mode of action has already been documented, the resistance risk for Insignia® is high. Insignia® is labeled for the control of seventeen turfgrass diseases that are incited by ascomycetes, basidiomycetes, and oomycetes. Insignia® is currently only labeled for use on golf course turf.

These new fungicides add treatment options for turfgrass professionals who manage their risk of fungicide resistance by rotating chemical classes. Rotating chemical classes of fungicides is one of several techniques that are used to reduce the development of fungicide resistance. Strategies used to avoid fungicide resistance include: never make more than two sequential applications of fungicides with the same biochemical mode of action, never use fungicides at a rate lower than stated on the label unless you are mixing two chemicals that have been proven to be synergistic, always make sure your spray equipment is calibrated and you are applying the fungicide evenly, and spray preventively whenever possible.

The fungicides discussed in this article represent three new chemical classes. Emerald®, Endorse®, Insignia®, and Medallion® have been tested for their efficacy at controlling various turfgrass diseases at the University of Wisconsin-Madison. If you have any questions regarding the efficacy of these fungicides or have any other questions, please consult the Wisconsin Turfgrass Research Reports or contact us at (608)845-2535. Additionally, if you are experiencing difficulty controlling certain diseases using fungicides that used to be efficacious, please let us know immediately and we will screen the pathogen for *in vitro* sensitivity to the fungicide.

TURF PROS

Nobody knows turf like the folks at Olds Seed Company. Whether it's a tee box or fairway, rough or green, the experts at Olds evaluate your specific situation, make recommendations, and deliver exactly what you need to make your turf look its finest. (Which makes you look pretty fine, too.)

Choose from our wide selection of proven bentgrass performers, such as:

- Providence
- Penncross
- Pennlinks
- Penneagle
- Putter
- Dominant

And ask about our custom mixture programs formulated for your site and budget.

You'll never come up short at Olds. We contract with numerous research and production firms so we have access to the best varieties available. Give us a call today and we'll help you improve your turf score.

Olds SEED

P.O. Box 7790 • 2901 Packers Ave.
Madison, WI 53707-7790
800-356-7333
608-249-9291

Seed you can count on

Plus a whole lot more

Mulches	***Low Maintenance***	***Erosion Control/Blankets***	***Wildflowers/Grasses***
Establisher	Care-free Fine Fescue	Futerra	For reclamation areas

38th ANNUAL WISCONSIN GOLF TURF SYMPOSIUM

By Dustin Riley, *Golf Course Superintendent, Oconomowoc Golf Club*

The Wisconsin Golf Course Superintendents Association and the Milorganite Division of MMSD presented the 38th Annual Wisconsin Golf Turf Symposium on November 18th and 19th, 2003 at The American Club located in Kohler. The title was *"Poa, Twenty Years Later."*

Twenty years earlier, in 1983, the 18th Symposium presented "The Facts and Fallacies of POA ANNUA Management." Twenty years ago, the main objective of most golf course superintendents and other turf managers was to prevent, reduce or eliminate any *Poa annua* contamination. *Poa annua* was "bad". *Poa* couldn't be trusted to live through summer. *Poa* couldn't be trusted to survive the Wisconsin winters. *Poa* couldn't be protected from many turf diseases. However, that was twenty years ago.

The 2003 Symposium assembled many of the nation's top *Poa annua* experts to present research and new management techniques contradicting many of the "facts and fallacies" presented at the 18th Symposium. Dr. John Stier of the UW-Madison, Dr. Joe Vargas of Michigan State University, Dr. Frank Rossi of Cornell University, Dr. Ron Calhoun of Michigan State University and Dr. Bruce Clarke of Rutgers University represented the research and technical information. Local superintendents Rod Johnson of Pine Hills CC and Monroe Miller of Blackhawk CC, along with several out-of-state superintendents, presented their experiences and acquired knowledge to the eager-to-listen audience. It appeared by the attendance numbers, turf questions and the conversations among attendees that this symposium was definitely one of the best. The Symposium committee should be congratulated on assembling a wonderful line-up of speakers covering such an important topic.

Dr. Joe Vargas began this year's Symposium by introducing a couple new ideas and terms, which caused some confusion when discussing annual vs. perennial *Poa annua*. In his presentation, Dr. Vargas presented many slides and information disproving the "old" thoughts that *Poa annua* is shallow-rooted and heat intolerant. With the proper management, turf managers can maintain deep rooting *Poa annua* while maintaining their *Poa* stand through summer stresses with the proper application of fungicides. It is Dr. Vargas' contention that *Poa annua* dies from summer diseases, not from heat and drought stress. During his explanations, Dr. Vargas introduced the term "colonizing *Poa*" for the quarter-sized *Poa* patches that produce seed heads and the term "competitive *Poa*" for the non-seeding spreading *Poa* communities. *Poa* annua begins its invasion as a colonizer type, eventually mutating or adapting into a competitive type.

Dr. Frank Rossi then presented the biology and ecology of *Poa annua*. Dr. Rossi reminded or educated the audience on the growth habits, life cycle and other growth processes such as root production and flowering.

Dr. John Stier followed by presenting data involving the effects of heat, light and winter stresses on *Poa*. One of the more memorable research information pre-

A long-standing friend of Wisconsin's golf course superintendents – Dr. Joe Vargas.

It doesn't seem possible that Dr. Frank Rossi left Wisconsin for Cornell seven years ago. It was great to have him back to our Symposium.

sented concerned the response of *Poa* to freezing temperatures. The research yielded results proving that low temperature winter kill began with the root mass freezing and then progressing upward toward the crown. Although the defense against low temperature winterkill has not been determined, the discovery that the low temperature freezing begins at the roots will hopefully speed the discovery of developing winter tolerant *Poa* stands.

Dr. John Stier represented our land grant university at the 2003 Symposium.

For many, the 2003 Symposium was the first time we'd heard Dr. Ron Calhoun of Michigan State. He is a very capable young faculty member.

Dr. Ron Calhoun presented an energetic discussion on several of the control options against *Poa*. Although Dr. Calhoun discussed many of the current growth regulators and herbicides available to the turf industry, he introduced the soon to be release product titled Velocity. This new chemistry has produced effective removal of *Poa annua* in bentgrass stands, even at green height of cut. The results seem promising. When Velocity becomes available in 2005 (estimated) control rates and application treatments should be determined and labeled.

Dr. Bruce Clarke presented modern disease management of *Poa annua*. Crown Rot Anthracnose has always been a very destructive turf disease on *Poa annua*. Over the past several years, the frequency and severity of anthracnose in Eastern US has prompted a serious re-evaluation of chemical controls. If approached correctly and treated preventively, crown rot anthracnose can be controlled and the damage reduced. However, if the disease symptoms begin and damage occurs, the curative process may result in thousands of chemical dollars and many sleepless nights for the superintendent.

Several out of state golf course superintendents supplied their perspectives on *Poa* philosophy and management theories. Mike

President Brandenburg ran the show for the last time. We're going to miss this guy!

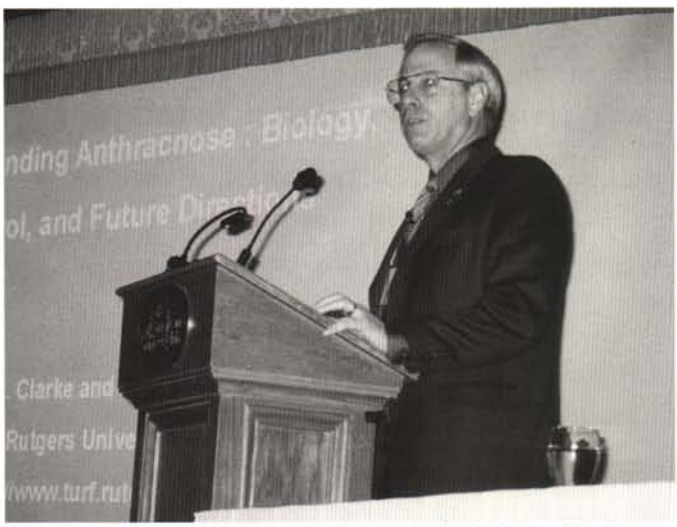
Jung, Stier and Abler of Wisconsin visit with Cornell's Rossi, a friend and former colleague.

Morris of Crystal Downs CC in Michigan explained his experiences and management techniques. Craig Currier of Bethpage State Park in New York provided information on U.S. Open preparations. Craig also provided slides of one of the Bethpage State golf courses that is operating "pesticide-free". Those illustrations provided further proof that *Poa annua* cannot survive environmental stresses without the protection from chemical applications.

Michael McNulty of the Philadelphia CC in Pennsylvania explained the Philadelphia CC's conversion to bentgrass. The ryegrass/*Poa* fairways were successfully fumigated with the granular product, Basamid. Thorough application and proper seeding resulted in about 100% bentgrass cover in about 60 days. Michael's experience with Basamid answered many questions many superintendents may have had concerning the fumigant.

Two in-state superintendents, Rod Johnson and Monroe Miller, supplied the finale to the Symposium by giving their opinions toward *Poa* management at their respective golf courses. For Monroe, managing the *Poa annua* stand at Blackhawk CC in Madison is a necessity, due to the high population. Rod Johnson, Pine Hills CC, has spent his career defending against the invasion of *Poa*, only to see his populations increase and become "resistant" to chemical and management efforts.

Twenty years ago, maintaining solid bentgrass stands produced the great playing surfaces. Today, *Poa annua* can also produce a quality, playing surface. Management just requires a different approach. Understanding the biology, ecology and requirements of *Poa annua*, turf managers can grow and maintain great playing *Poa* stands. If reducing *Poa annua* is the goal, hopefully new chemicals, such as Velocity, will provide some defense against the "bad" grass.



One of Wisconsin's favorite turfgrass pathologists – Dr. Bruce Clarke from Rutgers University.

Mike Morris, superintendent of the famed Crystal Dawns CC in beautiful Frankfort, Michigan, made his second Symposium appearance in the span of three years.

Craig Currier, Mike McNulty and Mike Morris gave wonderful presentations on their management programs and techniques. They are all at the top of our profession.

Craig Currier even found time for a book signing!

WATERTRONICS®

Evolution Series

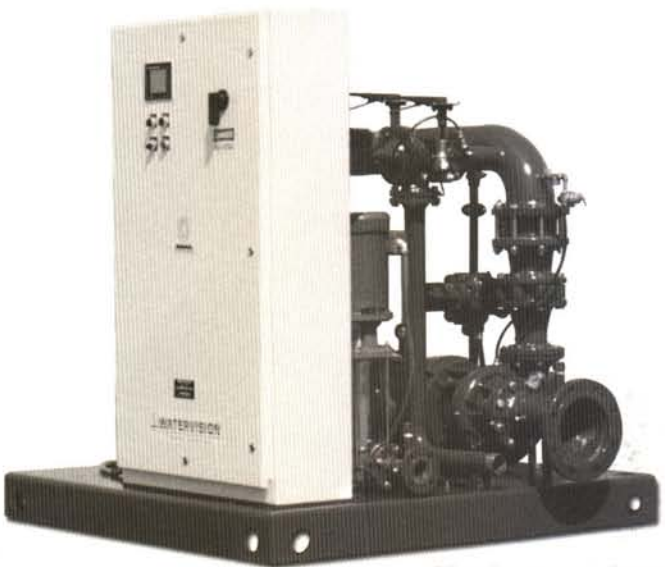
Super Sport - Turf

The "Evolution Series" pumping system is a proven concept from Watertronics that utilizes a VFD driven jockey/pressure maintenance pump and Electronic Butterfly Valve controlled main pump(s). This control system allows for VFD control of the pump that most benefits from it. Conventional VFD stations share one drive between all main pumps which can cause "across-line" start/stop surges.

Vertical Turbine

Benefits and features of an Evolution Pump Station include:

- VFD driven jockey pump which efficiently performs dual duties of pressure maintenance, while serving as the primary supplier of incidental daytime syringing and hand watering up to 150 GPM.
- Additional pumps are individually pressure regulated with Watertronics' Electronic Butterfly Valve, ensuring surge-free starts and stops.
- Lower horsepower and smaller electrical in-rush of the VFD regulated jockey pump normally will not incur utility "time-of-day" penalties.
- Available with Watervision™ remote monitoring software and Pumplink™ irrigation control software interface.



Horizontal Centrifugal

The "Evolution Series" control system is available on all Watertronics' Vertical Turbine, Horizontal Centrifugal, Super Sport Turf, and BlackMax™ Submerged pumping systems. Call a Watertronics' representative today and find out why our "Evolution Series" may be the best choice for your irrigation pumping system needs.

WATERTRONICS®
ELECTRONICALLY CONTROLLED PUMPING SYSTEMS

525 Industrial Drive, P.O. Box 530, Hartland, WI 53029-0530
Phone: 262-367-5000 • 800-356-6686 • Fax: 262-367-5551
Visit our website at: www.watertronics.com