Hosted by Clark Throssell, Ph.D. | *clarkthrossell@bresnan.net*

Super Science

//**TIMING IS EVERYTHING**

METHIOZOLIN RATE AND SPRING APPLICATION TIMING AFFECT ANNUAL BLUEGRASS CONTROL ON PUTTING GREENS

Methiozolin is a new herbicide reported to control annual bluegrass in creeping bentgrass putting greens. However, the appropriate application timing and rate to maximize efficacy is still not clear.

The objective of this experiment was to determine the optimum rate and timing of spring applications for annual bluegrass control. The experiment was conducted in Knoxville, Tenn. and West Lafayette, Ind. Individual applications in March, April and May, or programs of March + April, April + May or March + April + May at two methiozolin application rates (0.45 or 0.9 lbs. /acre) were tested. Applications were made at the first of each month in Tennessee and the middle of each month in Indiana. Results from both locations concluded that sequential applications which contained the early spring (March) applications provided the best efficacy.

The research site on the Ackerman Hills Golf Course at Purdue University.

In Indiana, plots receiving 0.9 lbs./acre methiozolin sequentially applied March + April + May controlled annual bluegrass up to 44 percent, in Tennessee the same treatment provided 99 percent control. A single March application was not effective in Indiana but provided 97 percent control in Tennessee. Tennessee reported up to 40 percent annual bluegrass control with either a single April or May application at 0.9 lbs./acre, but no control was observed in Indiana.

Annual bluegrass was not controlled from the 0.45 lbs./acre applications in Indiana, but in Tennessee the 0.45 lbs./acre rate provided control that was similar to 0.9 lbs./acre. Differences between locations were likely due to different annual bluegrass biotypes at each location, and emphasize the importance of conducting annual bluegrass research at multiple locations. In general, methiozolin proved to be a useful tool for annual bluegrass control in creeping bentgrass greens.

Jon M. Trappe, Aaron J. Patton and Daniel Weisenberger work in the Agronomy Department at Purdue University. Gregory Breeden and James Brosnan work in the Plant Sciences Department at University of Tennessee. Trappe can be reached at jtrappe@purdue.edu.

PHOTO BY: AARON PATTON

NEWS UPDATES

E-PAR USA OFFERS CERTIFICATION

The e-par Group and e-par USA announced recently that their Enviornmental Management System Certified Professional program is now available to superintendents in the U.S.

The program has been available in Australia since 2010. It recognizes individuals who have knowledge of systems-based environmental management and the requisite skills to build and implement a comprehensive environmental management system.

"I think it's important to be able to provide the option of professional recognition to individuals who are leading the way in golf through the use of well-established environmental management standards," says Kevin Fletcher, Ph.D., president and CEO of e-par USA.

The e-par EMS Certified Professional program is based on internationally recognized standards, meeting ANSI/ISO/IEC 17024:2003 standards. For more information visit www.eparusa.com.

> "USING RESULTS OBTAINED FROM OUR RESEARCH, THERE ARE OPTIONS FOR AFFORDABLE SNOW MOLD REDUCTION. ALL 6 OF THE TREATMENTS LISTED WERE BELOW $10,000 FOR 30 ACRES OF COVERAGE IN 2011."
>
> **Paul Koch, Ph.D.**
> *(see full story on page 40)*

//DISEASE MANAGEMENT

Secure fungicide and dollar spot control

By Mike Agnew, Ph.D., and Lane Tredway, Ph.D.

Fungicides have been used to control turfgrass diseases since the early 1900s. Up until the late 1960s, fungicides that were developed can be classified as having a multi-site mode of action. Multi-site fungicides, such as chlorothalonil and Mancozeb, are surface protectants (contacts) that disrupt different metabolic processes in the fungal cells (Latin, 2011). With the development of benomyl in 1968 and up to 2012, all fungicides that were introduced into the turfgrass market can be classified as single-site fungicides. These fungicides bind to a specific enzyme or interfere with a single metabolic process within the disease-causing fungus. Most penetrate and translocate in the plant, and many are at risk to the development of fungicide resistance.

In the fall of 2012, Syngenta introduced Secure, the first multi-site fungicide since the registration of Daconil fungicide 2787 in 1966. Secure is a preventive contact fungicide for golf course use that provides control of multiple diseases, including dollar spot, brown patch and leaf spot. The active ingredient in Secure is fluazinam. It is the only turf fungicide in the Pyridinamine chemical class. Classified by the Fungicide Resistance Action Committee (FRAC) in Group 29, fluazinam disrupts the production of energy at multiple metabolic sites within the fungal cell (Anonymous, 2013). This unique class of chemistry, along with its multi-site mode of action, translates to minimal risk of fungicide resistance.

No known resistance has developed to Secure, making it an excellent partner for products that require the use of a protectant fungicide with a different mode of action.

Secure fungicide contains 4.17 pounds of active ingredient (fluazinam) per gallon. The use rate for Secure is 0.5 fluid ounces per 1,000 square feet of turf applied on a 14-day interval. This delivers a very efficacious fungicide at a rate that is 58 to 85 percent less active ingredient per acre than any other multi-site fungicide (Anonymous, 2006, 2011, 2012). The product label allows for a maximum number of 12 applications per year, allowing the golf course to have a multi-site fungicide in every application. As with any multi-site contact fungicide, applications should be made preventively.

Dollar spot (*Sclerotinia homoeocarpa* F.T Bennett) may well be the most

TABLE 1

Impact of Fungicides on Dollar Spot Development of a Creeping Bentgrass Fairway — Rutgers University 2011

Fungicide[2]	FRAC Code	Rate (/1000 ft²)	Number of lesion center/plot[1]						
			June 29	July 8	July 19	July 29	Aug 10	Aug 18	Aug 26
Secure[3]	29	0.5 fl oz	2.3 p-s	1.8 k-m	0.5 fg	0.0 r	0.0 s	0.0 x	0.0 y
QP Chlorothalonil 720[3]	M5	2.0 fl oz	4.5 m-s	5.5 e-m	4.8 d-g	17.5 i-o	8.8 f-n	26.3 g-j	18.5 j-r
Banner Maxx 1.3 ME	3	1.0 fl oz	0.3 rs	1.3 lm	0.0 g	2.0 p-r	0.0 s	4.0 t-x	4.5 t-y
26GT[3]	2	2.0 fl oz	0.5 rs	2.3 j-m	1.0 fg	2.3 p-r	1.3 q-s	11.8 l-v	15.8 k-s
Emerald 70WG	7	0.13 oz	0.3 rs	1.3 lm	0.0 g	0.0 r	0.0 s	1.0 v-x	0.5 xy
Untreated			61.5 a	38.0 a	30.8 a	101.0 a	32.5 a	70.0 a	73.8 a
Days After Application			8	3	14	10	8	2	10

[1] Values are means of four replicates. Means followed by the same letter are not significantly different according to Waller-Duncan k-ratio t-test (k=100).
[2] Fungicides were applied on May 24, June 7, June 21, July 5, July 19, August 2 and August 16.
[3] Treatments were applied in 1 gallon of water/1,000 sq. ft., whereas all other treatments were applied using 2 gallons of water/1,000 sq, ft.

TABLE 2

Impact of Secure Application Interval on Dollar Spot Development of a Creeping Bentgrass Fairway — University of Connecticut 2012

Fungicide[2]	FRAC Code	Application Interval (days)	Rate (/1000 ft²)	Number of lesion center / plot[1]						
				July 7	July 18	July 27	Aug 9	Aug 17	Aug 23	Sep 7
Secure	29	14	0.5 fl oz	0.3 d	0.0 g	0.3 e	0.5 i	0.0 d	0.0 c	1.8 de
Secure	29	21	0.5 fl oz	0.0 d	27.5 d	9.0 de	45.3 de	0.3 cd	0.0 c	0.8 e
Untreated				112.5 a	158.5 a	212.0 a	191.5 a	163.0 a	111.5 a	222.8 a
Days After Application (14/21)				10/10	7/21	2/8	1/1	9/9	15/15	30/30

[1] Values are means of four replicates. Means followed by the same letter are not significantly different.
[2] Fungicide applications were initiated on May 18th and applied on either a 14- or 21-day spray interval.

economically important disease on golf course turf. This disease will infect many turfgrass species, but especially creeping bentgrass and annual bluegrass greens, tees and fairways (Latin, 2011). Dollar spot causes sunken, circular patches that measure up to 2 inches in diameter on golf greens and several inches on higher mown turf. Under severe disease conditions, these spots can coalesce, forming irregularly shaped areas.

The dollar spot pathogen survives unfavorable periods as mycelium in plants and as stroma on the leaf surface. The fungus is easily disseminated from plant to plant by mowing and water. When weather conditions favor the fungus, the mycelium will colonize the foliage. These conditions include warm days, high humidity, cool nights and intense dews. Cultural practices such as morning dew removal, minimizing irrigation frequency and applying adequate nitrogen can help reduce dollar spot development, but preventive fungicide applications remain an essential practice for golf course tees, fairways and greens.

While there are many fungicides available for the control of dollar spot, annual application limits and fungicide resistance have created a need for more options. The development of a new fungicide for the control of dollar spot should be accompanied by determination of the optimum application techniques for disease control.

TABLE 3

Impact of Water Carrier Volume on the Efficacy of Secure for Dollar Spot Control 2012

Test Location[1]	Application Date	Rating Date (2012)	Water Carrier Volume		Untreated
			1 gallon	2 gallon	
Penn State University University Park, PA	August 1	August 8	0.0[2]	0.0	201
University of Connecticut Storrs, CT	July 18	July 29	0.0	0.0	280
Bellwood Golf Couse Pottstown, PA	August 13	August 20	0.3	0.0	15

[1] Cooperators are Dr. John Kaminski, Penn State University, University Park, PA; Dr. John Inguagiato, University of Connecticut; Mike Fidanza, Ph.D., Penn State University, Reading, PA.
[2] Data indicates the number of dollar spot infection centers.

FIGURE 1

Impact of water carrier volume on the efficacy of Secure — Penn State, University Park 2012.

PHOTO COURTESY: MIKE AGNEW, PH.D.

Secure fungicide has been evaluated in dollar spot efficacy trials to compare it to other multi-site fungicides; determine optimal water carrier volume; evaluate its efficacy when applied through different types of nozzles; and demonstrate its effectiveness on DMI-resistant dollar spot.

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TABLE 4

Impact of nozzles on the application of Secure in a Curative Dollar Spot Trial — Penn State University, Reading, PA 2012

Nozzle	Droplet Size[2]	Number of lesion center / plot[1]		
		July 9[3]	August 5	AUDPC[4]
Raindrop (UC)	Ultra Coarse	15.0 ab	15.0 bc	788 b
TurfJet (EC)	Extremely Coarse	11.7 bc	7.3 cd	560 bcd
Air Induction(VC)	Very Coarse	2.7 gh	3.0 d	305 de
Turbo TeeJet (C)	Coarse	3.3 fgh	4.3 d	421 cde
XR TeeJet (M)	Medium	1.7 gh	1.7 d	236 e
XR TeeJet (F)	Fine	8.7 cde	7.0 cd	655 bc
Untreated		18.3 a	13.3 ab	1372 a

[1] Values are means of four replicates. Means followed by the same letter are not significantly different.

[2] Ultra coarse water droplet size diameter of > 622 microns; Extremely coarse water droplet size diameter of 428 to 622 microns; Very coarse water droplet size diameter of 349 to 428 microns; Coarse water droplet size diameter of 218 to 349 microns; Medium water droplet size diameter of 177 to 218 microns; Fine water droplet size diameter of 136 to 177 microns.

[3] Fungicides were applied on July 2, July 16 and July 30.

[4] The area under the disease progress curve (AUDPC) is a useful quantitative summary of disease intensity over time.

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EFFICACY TRIALS

Secure fungicide has proven to be a very effective dollar spot control product. It has performed equal to or better than other dollar spot fungicides. The effectiveness of Secure was demonstrated in a trial conducted by Bruce Clarke, Ph.D., of Rutgers University. The trial was conducted in 2011 at Hort Farm II located in North Brunswick, N.J. on 'Crenshaw' creeping bentgrass (*Agrostis stolonifera* L.) mowed at a height of 0.375 inches. Test plots measured 3 feet by 5 feet and were replicated 4 times. Secure, Chlorothalonil 720 (chlorothalonil) and 26GT (iprodione) were applied in a water volume of 1.0 gal/1,000 square feet and Banner Maxx II (propiconazole) and Emerald (boscalid) were applied in a water volume of 2.0 gal/1,000 square feet. Secure provided nearly 100 percent control for the duration of the trial (Table 1), and it provided significantly better dollar spot control than the untreated plots on all dates. When compared to Chlorothalonil 720 and 26GT, Secure provided significantly better dollar spot control on 4 and 2 rating dates, respectively. Dollar spot control was equal to Banner Maxx II and Emerald, both excellent dollar spot control fungicides. Secure and Chlorothalonil 720 only act on the surface of the plant as a contact fungicide while the other fungicides penetrate the plant to protection from inside the plant.

Another example of Secure's ability to control dollar spot is shown in a trial conducted by John Inguagiato, Ph.D., of the University of Connecticut. The trial was conducted in 2012 at the Plant Science Research and Education Facility in Storrs, Conn., on "Putter" creeping bentgrass mowed at 0.5 inches. Test plots measured 3 feet by 6 feet. Fungicides were applied in a water volume of 1.0 gal/1,000 square feet. Secure applied on a 14-day spray interval provided greater than 98 percent control (Table 2) despite very severe dollar spot pressure. Secure applied on a 21-day spray interval provided a significant reduction in dollar spot incidence, but this reduction was not agronomically acceptable on 3 of the 7 rating dates. This demonstrated that a more consistent level of control is achieved with a 14-day spray interval.

WATER CARRIER VOLUME

Secure fungicide was tested at three locations to compare its effectiveness when sprayed in different water carrier volumes. The sites included Storrs, Conn.; University Park, Pa.; and Pottstown, Pa. All sites were mowed at 0.5 inches. The Storrs and University Park trials were initiated prior to any disease infection, whereas the Pottstown trial was applied post infection. Secure was applied in a water volume of either 1.0 or 2.0 gal/1,000 square feet. Trials were conducted on creeping bentgrass mowed at 0.5 inches. There were no differences in the dollar spot efficacy of Secure when applied at either water volume (Table 3). This demonstrates the versatility of Secure in controlling dollar

TABLE 5

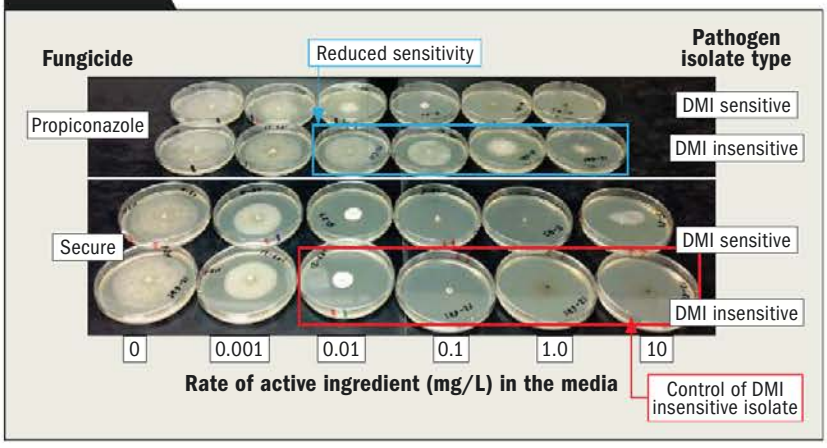
Impact of Secure on the control of DMI insensitive dollar spot in a curative trial – Turfgrass Disease Solutions, 2010

Fungicide	Rate (fl oz/1000 ft²)	Number of lesion center / plot[1]					
		Initial Oct 8	Oct 22	Oct 28	Nov 3	Nov 19	Dec 17
Secure[2]	0.5	11.5	12.3 b	5.5 b	2.5 b	3.3 b	2.9 c
Daconil WeatherStik	3.6	10.8	19.0 ab	21.3 b	12.0 b	5.0 b	4.1 c
Banner Maxx	1.5	17.3	31.5 ab	16.0 b	10.8 b	10.3 b	9.5 bc
Untreated		16.5	35.3 a	56.3 a	40.0 a	29.3 a	32.5 a

[1] Values are means of four replicates. Means followed by the same letter are not significantly different.

[2] Fungicides were applied on October 8, October 22 and November 3.

FIGURE 2



In vitro control of DMI of insensitive isolates.

spot. Figure 1 demonstrates the effective control of dollar spot by Secure in both water carrier volumes.

NOZZLES AND WATER DROPLET SIZE

Mike Fidanza, Ph.D., of Penn State University, evaluated Secure when applied through six different nozzles that emitted six different droplet sizes. The test site was a creeping bentgrass driving range that was maintained at a height of 0.5 inches. Secure was applied at a rate of 0.5 fl oz per 1,000 sq. ft. to turf that had active dollar spot. The nozzle types and droplet sizes are described in Table 4. The application of Secure through nozzles with droplet sizes in the 177 to 428 micron range provided the best dollar spot control. Secure applied through a nozzle that emitted a droplet size greater than 428 microns or less than 177 microns failed to provide adequate disease control.

RESISTANCE

Secure is ideal for inclusion in programs designed to minimize disease resistance to single-site fungicides when used as a tank-mix partner or alternated in a disease management program. Fungicide resistance commonly develops due to the repeated use of single-site mode of action fungicides. No known resistance has developed to Secure, making it an excellent partner for products that require the use of a protectant fungicide with a different mode of action. In lab studies, Secure fungicide has demonstrated excellent control of dollar spot (*Sclerotinia homoeocarpa*) strains that are insensitive to DMI fungicides (Figure 2).

Steve McDonald of Turfgrass Disease Solutions (Spring City, Penn.), conducted a curative dollar spot control trial on a golf course fairway with known resistance to benzimidazole and DMI fungicides (Table 5). On October 22, turfgrass treated with Secure had significantly less dollar spot, when compared to the untreated control. Generally, plots treated with Secure had the least amount of dollar spot when compared to all other treatments.

Secure is a novel fungicide that offers the superintendent a valuable tool for the control of dollar spot and other diseases. It allows for the application of a multi-site dollar spot fungicide in every application.

Mike Agnew, Ph.D., and Lane Tredway, Ph.D., are senior technical managers at Syngenta. Agnew can be reached at michael.agnew@syngenta.com.

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PHOTO COURTESY: MIKE AGNEW, PH.D.

//SNOW MOLD DEFENSE

Beat the summer heat, plan for snow mold

By Paul Koch, Ph.D.

The dog days of summer are upon us, and it seems a little odd to be thinking about snow mold when you can't stop sweating. Alas, Mother Nature relentlessly bulldozes onto the next season whether we're ready or not. And to make sure we in the turf industry are ready for winter, it's time for many of us to begin preparations to protect our turf from snow mold.

Those in temperate climates with significant snowfall know just how important snow mold diseases can be. It doesn't matter whether it's gray snow mold (*Typhula incarnata*) in places with snow cover greater than 60 continuous days; speckled snow mold (*Typhula ishikariensis*) in areas with snow cover greater than 90 days; or even Microdochium patch (*Microdochium nivale*) in cool and wet conditions; snow mold can be a devastating disease for turfgrass managers (Figures 1, 2, and 3).

Snow mold diseases are particularly important diseases to manage because you usually only get one shot at it. It's one thing if you cut back on a dollar spot or brown patch management program, for if the disease breaks through you can curatively apply a fungicide and usually be back to normal in two weeks. Not so with snow mold.

If money is tight and you cut back on your snow mold management program after hearing forecasts of a mild winter, but instead receive a shellacking from Old Man Winter, well then you're pretty much buried as deep as your turf is under snow. To add insult to injury, snow mold diseases can be particularly damaging to a golf course facility's bottom line for two primary reasons.

First, the symptoms occur in the spring as golfers are at their most rabid to get out of the house and play golf. Second, if a cool spring persists that prevents rapid turf recovery, snow mold damage can be observed well into June. That can send golfers scrambling to neighboring courses for weeks or even months, drive down revenues at your course, and may have you polishing up your resume.

Fortunately, there are a multitude of options for effectively and affordably managing snow molds. But rather unfortunately, there are so many options that choosing the right one can be overwhelming. In a search for clarity, many superintendents will contact me for recommendations, though I always disappoint them with my answer: "It depends."

"Well what does it depend on?" they often respond. The variation in disease pressure, course expectations, and financial capacity between courses renders an effective fungicide recommendation impossible without further information. The fungicide program I recommend for a private country club in Minneapolis is not likely to be the same program I recommend for a 9-hole municipal golf course in northern Wisconsin.

WHAT DOES THE RESEARCH SAY?

Even after receiving all the pertinent information, it's difficult to recommend a single fungicide for snow mold

FIGURE 1

Gray snow mold, caused by *Typhula incarnata,* can decimate turf under snow cover for 60 days or more. Note the sharp line delineating between sprayed and non-sprayed turf at this course in Wisconsin.

PHOTOS COURTESY: PAUL KOCH, PH.D.

FIGURE 2

Speckled snow mold, caused by *Typhula ishikariensis,* causes severe damage in areas with snow cover greater than 90 consecutive days. At this course in Michigan's Upper Peninsula, where disease pressure is extreme, a "clean up" fungicide pass is made to protect the rough closest to the fairway while anything unsprayed is severely infected.

control because there are many effective options. One place to turn for help is university research, which is an independent means for determining what products are going to be effective. Several different universities across the country conduct fungicide research on snow mold, and here at the University of Wisconsin we have conducted snow mold fungicide efficacy trials at golf courses in Wisconsin, Minnesota and the Upper Peninsula of Michigan for years. The full list of all of our snow mold efficacy reports over the years, along with treatment pictures, can be found on the Research page of the Turfgrass Diagnostic Lab's website (www.tdl.wisc.edu/Research.php).

When looking at our trial results over the years the treatments generally can be separated into three groups: (1) those treatments that manage snow mold extremely well even under heavy disease pressures; (2) those treatments that significantly reduce snow mold severity but oftentimes allow some disease to develop; and (3) those that do not effectively manage snow mold.

As evidenced in research conducted during the winters of 2010-2011 (Figure 4) and 2012-2013 (Figure 5), those treatments most effective at managing snow mold often contain three or even four active ingredients. These active ingredients often are a mixture of different physical modes of action (contact, penetrant, etc.) and chemical modes of action (strobilurin, DMI, etc.). This mix provides the best opportunity for your treatment to survive exposure to the harsh winter elements over a period of two, three or four months or longer.

Which treatments have proven to be the most effective under heavy snow mold pressure? Based only on our own research here at Wisconsin, products that have consistently performed well over a number of years under heavy pressure include Instrata (chloroth alonil+propiconazole+fludioxonil),

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FIGURE 3

Microdochium patch, also called pink snow mold, doesn't actually need snow cover to develop and will develop any time conditions are cool and wet. But the most severe symptoms usually develop following snow cover on unfrozen ground, as evidenced at this course in the Rocky Mountain West.

PHOTO COURTESY: PAUL KOCH, PH.D.

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Interface (iprodione+trifloxystrobin) + Triton FLO(triticonazole), Insignia SC(pyraclostrobin) + Trinity (triticonazole), Torque (tebuconazole) + 26/36 (iprodione+thiophanate-methyl), and Quali-Pro TM/C (chlorothalonil+thiophanate-methyl) + QP Ipro (iprodione) + QP Propiconazole (propiconazole). You will probably notice that each one of these treatments includes at least three active ingredients, and some contain four. You will also probably notice that Syngenta, BASF, Bayer, NuFarm, and Quali-Pro are all represented in this list. That is not coincidental; each company has treatments that can effectively manage snow mold. How do you choose among these, you may ask? That will likely depend on the program's cost and who you're most comfortable working with. But the point is clear: You have options when choosing an effective snow mold fungicide.

TIMES ARE TIGHT, ARE THERE ANY LOWER-COST OPTIONS?

While the products listed above are certainly effective, they also can be costly. That is especially true when considering protecting acres of fairways. Based on an analysis I completed in 2011, protecting 30 acres of fairways with the treatments listed in the previous section can cost anywhere from $8,500 to over $15,000.

But what if your course doesn't require disease-free fairways every spring? Or what if snow mold pressure at your location is generally pretty light? Are there lower cost options that may not completely control snow mold but still provide some level of protection?

Fortunately, the answer is yes. Using the results obtained from our research over the years, there are several options for affordable snow mold reduction (Figure 6). All six of the treatments listed in Figure 6 were below $10,000 for 30 acres of coverage in 2011 prices. Torque and Trinity were just more than $3,000 for 30 acres, and Turfcide 400(PCNB) was closer to $1,000. It's important to note that fungicide prices vary considerably due to a number of factors and that these prices are from 2011. But it still gives a general picture of affordable yet effective options. It's also important to note that these treatments aren't likely to give you complete snow mold control.

All the treatments shown in Figure 6 reduced snow mold to less than 10 percent, an acceptable level on many fairways. However, if you're looking for much less than 10 percent snow mold control, I would recommend a more diverse mixture of compounds similar to those listed in Figures 4 or 5. It's also important to note that this analysis was only done on treatments that were included in our research at Wisconsin, and there are several other compounds (not to mention generic fungicides) not included in our research that can provide an affordable reduction in snow mold severity at your course.

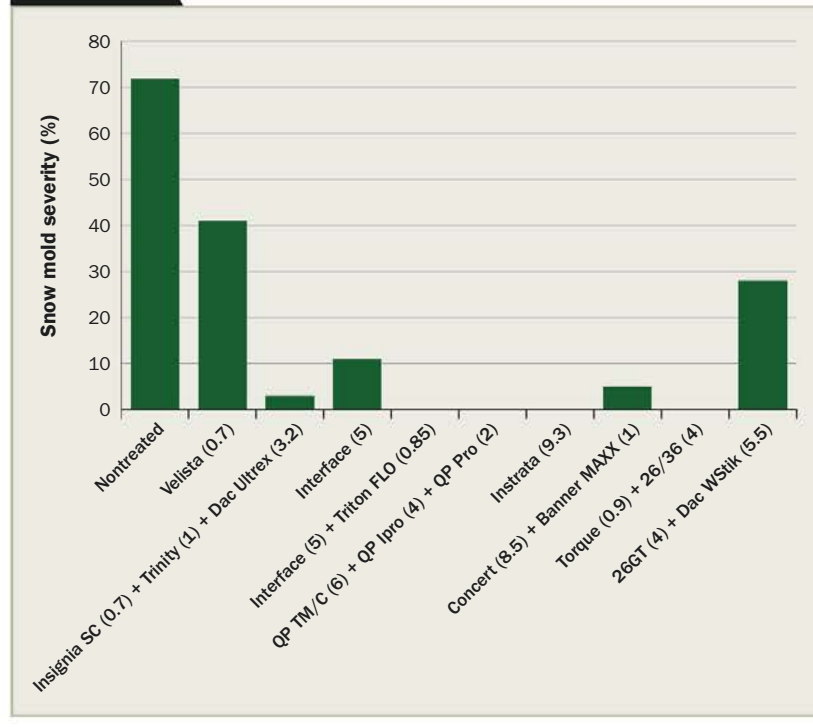
THE INTANGIBLES

It should be pretty clear by now that options for effective snow mold management are plentiful. That reality has led superintendents to look at aspects in addition to disease control to help them make their decisions. Since many products are priced competitively, the other intangible that can help sway a purchaser's decision is turf color. That is certainly nothing new to the turf fungicide market, as fungicides promoting improved turf color, health and stress tolerance are heavily marketed for summer fungicide applications. More recently, however, superintendents have been looking toward their snow mold fungicide applications to improve the color of the golf course coming out of snow melt the following spring.

Bayer's Stressgard pigments long have been a part of fungicides geared toward summer diseases but are now also included in products such as Interface that are primarily intended for snow mold. Other pigments such as Foursome by Quali-Pro and PAR by Harrell's also have been included in snow mold research here at Wisconsin the past few years, and the turf is significantly greener the following spring. Civitas (mineral oil), which includes the green pigment Harmonizer, has not

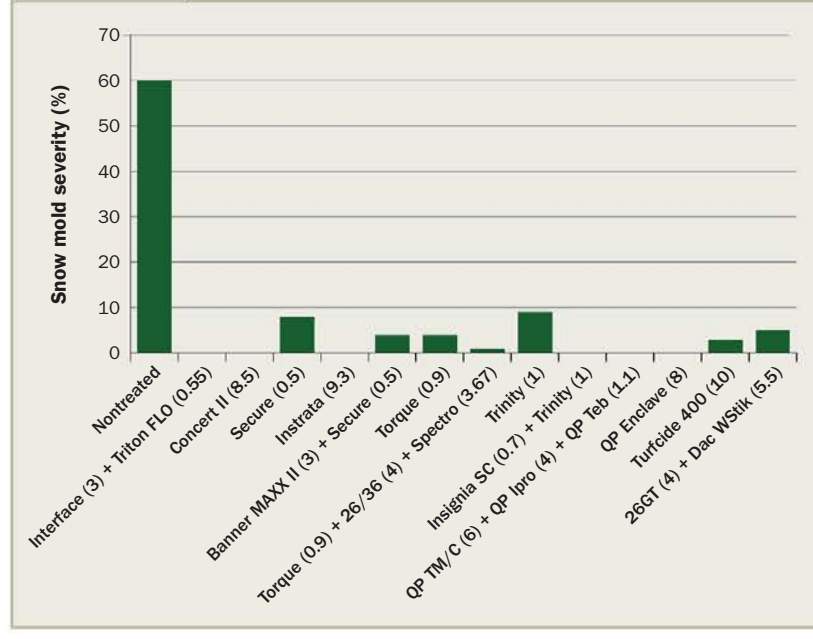
Continued on page 44

FIGURE 4



Comparison of a select number of treatments for speckled snow mold management at Sentryworld GC in Stevens Point, WI in the winter of 2010-2011. Fungicide rate in fluid ounces per 1,000 ft² is in parentheses. For the full trial results visit www.tdl.wisc.edu/Research.php

FIGURE 5



Comparison of a select number of treatments for speckled snow mold management at Wawonowin CC in Champion, MI in the winter of 2012-2013. Fungicide rate in fluid ounces per 1,000 ft² is in parentheses. For the full trial results visit www.tdl.wisc.edu/Research.php.

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provided acceptable snow mold control in most of our trials at Wisconsin but has provided exceptional green color the following spring (Figure 7). This green color fades rapidly as the turf comes out of dormancy, but superintendents looking for any advantage they can get in difficult early spring conditions may find the brief green-up beneficial.

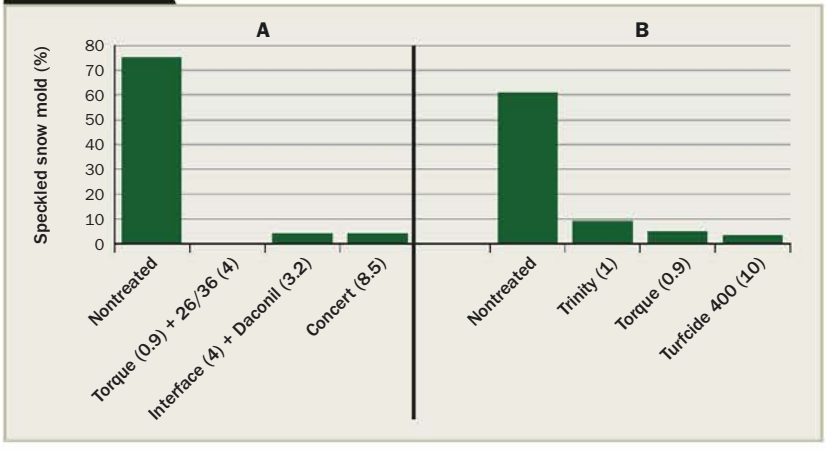
THE FINAL WORD

If options are what you crave in life, then choosing a snow mold fungicide program should leave you drooling. Too many effective options exist for me to list just a few, and what may work well for one facility may not quite fit with another facility for a number of reasons. The best recommendation I can give is to use the research provided by university efficacy trials to determine what products are effective in conditions similar to yours. Take these products and discuss pricing and other intangibles with a sales or technical representative you're comfortable with, and come up with a plan for effective and affordable management of snow mold at your course. Then sit back and rest easy for the winter…unless ice starts to form.

Author's note: Listing of specific products in this article is based on research conducted at the University of Wisconsin and is not intended to be an endorsement of the product or of the manufacturer.

Paul Koch, Ph.D., is a research scientist at the University of Wisconsin-Madison. Contact him at plkoch@wisc.edu.

FIGURE 6



Efficacy of lower-cost options for control of speckled snow mold (*Typhula ishikariensis*) at (**A**) Sentryworld GC in Stevens Point, WI in 2010-2011 and (**B**) Wawonowin CC in Champion, MI in 2012-2013. Fungicide rate in fluid ounces per 1,000 ft^2 is in parentheses.

FIGURE 7

Civitas combined with Harmonizer, in addition to several other turf pigments and pigmented turf fungicides, applied in the fall can produce dramatically "greener" turf the following spring compared to non-treated turf. This photo was taken five months after the application on March 15th, 2012, in Madison, WI.

PHOTO COURTESY: PAUL KOCH, PH.D.

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