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What's the next big idea at Spectrum Technologies

BY SETH JONES

Mike Thurow likes pain.¶ Not physical pain, but pain in business. When a group is having a pain with their business, he says he sees that as a business opportunity.¶ So it could be said that Thurow, president and CEO of Spectrum Technologies Inc., enjoys it when superintendents have a pain in the grass.¶ "If a superintendent has a pain, then we will look for the solution," Thurow says.

For example, the FieldScout TDR 300. Available for about 15 years now, the technology has caught the industry by storm in the last five. The portable tool gives instantaneous readings of root zone soil moisture, allowing turf pros to spot-water only the areas that really need it.

Today the TDR 300 can be seen at golf courses across the country. "It's the single best tool I've bought in the last five years," says Dan Dinelli, CGCS at North Shore CC in Chicago. That seems to be a common sentiment around the industry, so much so that here at *Golfdom* we even featured the product on our cover last year.

So it's no surprise that Thurow has a big grin on his face when he makes his next statement. "In my 40 years in the industry, I've never seen adoption of a product such as I have with the TDR," he says. "It's because the guys at the USGA and the PGA believed in it. Word travels efficiently in this industry. It's a network, more so than any other crop segment."

Thurow says sales of the TDR increased 80 percent from 2010 to 2011, then doubled from 2011 to 2012. He anticipates more success for the product this year. Behind the TDR, turf now accounts for 30 percent of his total business. Previously it accounted for 5 percent of his business.

Golfdom recently visited Spectrum Technologies in the Chicago suburb of Aurora, Ill. We asked one main question: What is the company's next big idea?

"We're in the measurement business. We want to help superintendents figure out how to do their jobs better."

MIKE THUROW

GreenIndex+

Available beginning next month is the FieldScout GreenIndex+ for turf applications . The premise is simple: it's a tool to give an exact reading on how green the grass is.

The value, according to Adam Rusciolelli, vice president of product development for Spectrum Technologies, is it takes the guesswork out of applying nitrogen.

"We're trying to make color measurements more consistent and objective. The app can assist in making decisions associated with declining greenness. It's a tool to help keep turf in the optimal range, not over- or under-fertilized," Rusciolelli says. "Once it's calibrated any person can go out and take the measurements."

Through a photo taken by a smartphone, the GreenIndex will give superintendents an exact measurement of how green the grass is.

The equipment includes a small board with three colors, and a smartphone app. The user takes a photo of the board and surrounding turf with the smartphone. The app locks in on the board, and uses those colors as a control. So shadows, sunlight or hazy weather won't impact the reading of the grass.

The photo then gives the user an objective numeric value as well as an equivalent visual rating for how green the grass is.

"For even the most experienced turf professional, finding the right fertilization formula can be challenging. Nitrogen should be spoon-fed. If you get a rain event, it's gone," Thurow says.

Perfecting the TruFirm

Invented by Matt Pringle, Ph.D., of the USGA, the TruFirm has been utilized to determine ground firmness. The USGA has partnered with Spectrum Technologies to leverage the technology and create a more affordable version of the TrueFirm. Through a licensing agreement, this new TruFirm will include both the USGA and Spectrum Technologies logos on the tool.

"We've redesigned it to make it better value for superintendents," says Jacob Madden, director of marketing at Spectrum Technologies. "The first TruFirm and similar competitive products are more elaborate and expensive."

The new TruFirm — available this fall — will also include an app that allows users to break down greens in nine segments and save that information for future reference.

Bluetooth-enabled TDR

The TDR 300 — the first product mentioned in this article — has been so good for Spectrum Technologies that it shouldn't be a surprise that the company is looking for ways to improve it.

By giving it the power of Bluetooth, they believe they have.

"Bluetooth is so powerful and affordable. It's simply a chip," says Madden. "You can already log the data and download the data, but you can't automatically shoot that data to a device at this point in time. Bluetooth would simplify this process to save valuable time."

The target release date for the Bluetooth TDR 300 is the 2014 Golf Industry Show in Orlando.

Would you like to see articles similar to this in the future? If so, what companies would you like to see profiled? Write to us at sjones@northcoastmedia.net or tweet at us @Golfdom.

PHOTO CREDIT: SETH JONES / ISTOCKPHOTO (OPPOSITE) / SHUTTERSTOCK (TOP)

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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.

Continued on page 38

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.

Continued from page 37

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

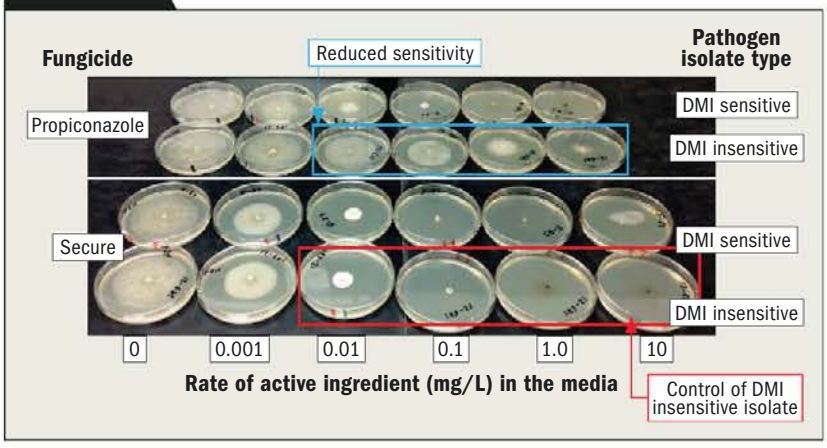
Impact of Secure on the control of DMI insensitive dollar spot in a curative trial – Turfgrass Disease Solutions, 2010

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.