

the cabbage again! That was truly a humbling day! Thank God that we now have these huge rotary rough mowers that keep things under control in the roughs!!!

9) Do not job hop... do not keep looking for greener pastures... do not bitch and whine... and please stay in place longer than 18 months at a crack. I basically had to move to Illinois in 1994 to escape the shaky reputation that I'd built for myself in my early years...

10) Remember always that Wisconsin... is no more beautiful than my adopted state of Illinois! I have learned to love the beauty of the endless cornfields, the stench, the craggy beauty, and the graceful gulls that one associates with the landfill mountains just east of town! This bit of advice comes from a guy who has been in the Land of Lincoln for 7-8 years now. If you doubt me or think me sentimental... think about living in beautiful Onalaska as compared to living on the fringes of those beautiful south ChicagoLand suburbs. Ah... Chicago!!

Admissions and confessions are so cleansing and liberating... whether recounting ancient history or more recent happenings... these days, my admissions and confessions revolve around the whole Spanish/English/translation thing. And yes, there are many enlightened people down here who admit and confess to their ignorance of the latino culture thing when they boldly state that "Hey, Pat, you speak pretty good Mexican!"

We like to think that we speak pretty good Spanish... when in reality, my Spanish sounds only slightly better than their English! I admit to making many language errors... resulting in little mistakes such as;

- pura gasolina* being filled into a weed whacker that requires gasolina mixtiada
- esa maquina se usa gasolina y no se usa diesel
- esa maquina se usa diesel y no se usa gasolina

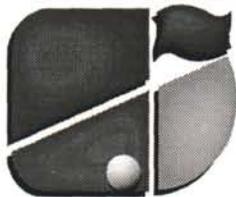
Maybe amongst our successes we should admit to our mistakes, and confess our golf course sins a bit more. Then... at monthly meetings guys could have tons more fun roasting and toasting each other instead of taking

things so seriously!! Maybe more superintendents should admit to and confess to a few of their own whopper mistakes... such as letting fungicide tanks overflow due to distraction... or calibrating things just a bit off rate... oops!!! Or simply using a tad bit too much greens fert just before July Fourth weekend... and later admitting to self that reading the fert label would have been a good thing!

Inspire yourself as you help mow greens on a too early, too cold Sunday A.M. with nothing else on your mind. Think about some of the cute little magic tricks performed by yourself or your staff during the current season or in years past. Start a poll in your head about your own "Top 10" screwups... or 'best all-time whopper mistakes by the maintenance staff'... or best all-time boners by either a golf professional or club manager. It can be great fun...

As I've aged... I've also assumed lots of other fun responsibilities at this public golf facility. Part of the trick with senior management is to get other people to realize that it's not a heinous crime to make a few mistakes... if they're out there working hard, being creative, and being highly productive. The biggest mistake most people seem to make is to underestimate their own abilities... and then underperform as a result. The other trick with senior management is to make everybody... from the cooks to the greenkeepers to the cart kids... realize that the foundation for a solid professional career starts NOW... with the job that you have right now!!! And even if you're multi-talented like superintendents everywhere... you'll make mistakes. Then someday... you'll be able to make a few self-secure admissions and confessions... which will make your staff secretly chuckle as they discuss your foibles in a foreign language around the lunch table!!

If you can come up with at least a few admissions and confessions... and see the humor in your errors... then you can survive in this business like the old farts have! Don't be too public, though, about your missteps... you might end up like me... admitting to everything and confessing to things better left unsaid! ♣



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Fungicides: What You Should Know

Part III: Developing Disease Resistance Management Regimes

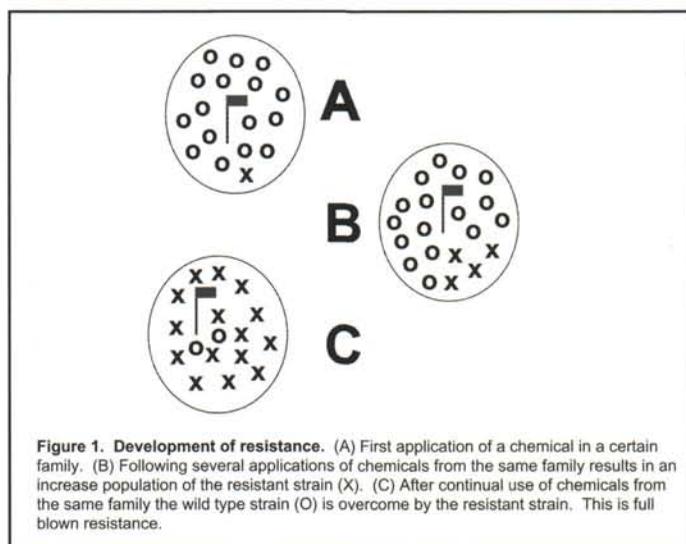


By Jeff Gregos, TDL, Department of Plant Pathology, University of Wisconsin-Madison

Over the last couple of issues of *The Grass Roots*, I have provided a wealth of information relating to fungicides. I hope that it has been informative and helpful in selecting products for your disease control program. This is the third and final installment for *Fungicides: What You Should Know*; it will be covering fungicide resistance and resistance management regimes. I hope that you enjoyed this series and I am always open to suggestions for articles in the future.

Resistance Management

Resistance management is a vital part of any disease control program. One common misunderstanding about resistance is how it occurs. Resistant strains of a fungus are not a mutation caused by the fungicides that you apply, but rather a mutation that has occurred sometime in the past and the fungicides only enhance the resistant strains. With repeated applications of fungicides from the same chemical family, it will lead to resistant strains of the fungus eventually outnumbering the wild type strain. An example of how resistance occurs on a golf course is provided in figure 1.



Resistance Prevention

Currently there are two commonly accepted theories for resistance prevention. While there is a new one suggested in 1998, I will only touch on it briefly at the end of this section, as I feel that it is not very practical. The first of these is rotation of chemical families. With rotation, you alternate chemical families from applica-

tion to application. You never want to apply the same chemical family more than twice in a row. Examples of possible rotations are provided below.

- XOXOXO X = Chemical Family A
- XXOXX O = Chemical Family B
- XOOXXO

These are only an example using two chemical families. With knowledge of chemical families the possibilities of rotation patterns is endless.

Another method of resistance prevention is the use of reduced-rate mixtures. With reduced-rate mixture you have three components, each from a different chemical family, at a reduced rate. With reduced rates of individual components ranging from 1/16th to 2/3rd the labeled rate; in combination these mixes provide excellent control of diseases such as dollar spot. The theory behind this is that you want 1/3rd, 1/3rd and 1/3rd control from each of your components. This is not synergy (when chemicals are combined the additive effect is greater than each component when applied individually, i.e. 1+1=3) but an additive effect. You do not want one chemical to overpower, or provide the majority of the control, than the other two components or resistance may develop. If there are resistant strains present, one of the other chemicals will inhibit its growth.

The last one is "use it until you lose it," suggested by Dr. Joe Vargas. This method suggests using the same chemistry constantly until you develop resistance, switch to another chemistry. Even though this does have some merit, I cannot suggest it because of the nature of development of new chemistries. On average it takes at least 10 years for a new chemical to get to market, and could take longer with the new regulations in EPA. It also costs millions of dollars to get them to market. Even if the other methods do not delay resistance (the rotation method has been proven to delay, but not eliminate resistance, while three-way mixtures are proven to delay and the verdict is still out whether or not they eliminate resistance) this method is totally unfeasible with current state of the fungicide development.

For more information on reduce-rate mixtures, please refer to the *2000 Wisconsin Turfgrass Research Report*.

Literature Cited:

- Vargas, J. M. *Management of Turfgrass Disease*. 1994. Lewis Publishers.
- Vargas, Joe. 1998 *Chipco Turfgrass Disease Seminar*. 1998. Rhone-Poulenc AG Co.

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Here to Stay!

By Dr. R. Chris Williamson, Turfgrass and Ornamental Entomologist, University of Wisconsin-Madison

My sincere appreciation and thanks go out to everyone involved in securing my position at the University of Wisconsin-Madison. I am now officially an assistant professor in the Department of Entomology. For those of you not familiar with the history of my position, Dr. Chuck Koval was responsible for turfgrass and ornamental extension activities, teaching, and research. However, Dr. Koval retired in 1994, as a result Dr. Dan Mahr and Phil Pellitteri diligently kept the program alive even though turf and ornamentals were not their areas of responsibility. Having no one specifically dedicated to turfgrass and ornamentals for approximately four years, the university realized the need for such a position. Subsequently, a national search was conducted, candidates were interviewed, and I was offered the position, accepted it, and was hired in December of 1998 by Dr. John Wedberg (former Department of Entomology Chairperson).

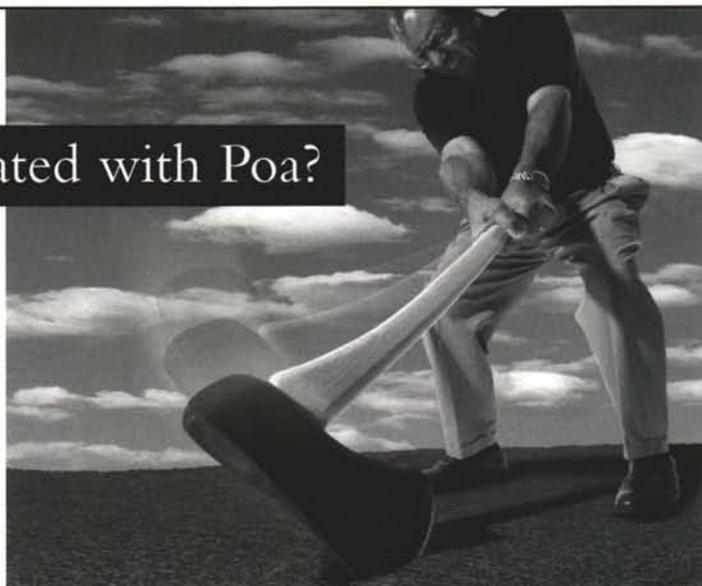
I was not hired as an official faculty member; my position was a short-term, interim position that was expected to be self-funded within three to four years. Nonetheless, I optimistically accepted the position with the goal of one day having the position converted into a permanent, tenure-track, faculty position. Through the efforts of many people, ranging from current and previous administrators, to industry constituents, to intra- and interdepartmental faculty, to county agents, this turfgrass and ornamental entomology position was developed into a tenure-track, faculty position.

As a result of the establishment of this "new" position, another national search was required; thus I had to

apply, interview and compete with other well-qualified candidates. Ultimately I was offered, and I accepted the position as assistant professor, Department of Entomology. My position appointment is 70% extension (outreach) and 30% research.

If it were not for the diligent efforts of everyone, I would not have the opportunity to serve you, nor would there be a turfgrass and ornamental entomologist at the University of Wisconsin-Madison. So, I want to extend my sincere appreciation and thanks to everyone. 🌿

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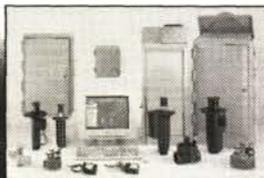
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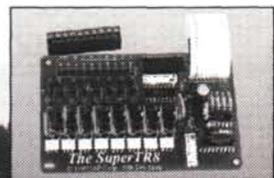
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Fungicide Resistance in Strobilurin or Strobilurin Analogues?



By Dr. Geunhwa Jung, Department of Plant Pathology, University of Wisconsin-Madison

Strobilurins are naturally occurring chemicals produced by wood decaying mushrooms. What is so fascinating about these fungicides? They are important broad-spectrum systemic fungicides recommended for the control of many fungi in a wide range of crops including turfgrass and have relatively low toxicity toward mammals. Fungicides of Strobilurin-Type Action and Resistance are called "STAR" or QoIs. They include kresoxim-methyl, azoxystrobin (Heritage® from Syngenta), trifloxystrobin (Compass® from Bayer) and famoxadone. Two new strobilurin fungicides [Insignia (pyraclostrobin) and Honor (unknown common name)] from BASF were developed for the control of turfgrass diseases. However, they are not yet registered. Personnel from BASF fungicide testing have informed me that Insignia will be registered next year and Honor will probably be registered in 2003.

These fungicides are potent inhibitors of spore germination, which makes them excellent protectants. In addition, they also have curative as well as the anti-sporulant activity. Some can move systemically through the xylem and have excellent root uptake. They also have translaminar movement in the leaf. This type of fungicide specifically inhibits electron transport in mitochondria, which are the fungi cells' "power houses." Basically, respiration of the phytopathogenic fungi will be inhibited.

Understanding the basic process of fungicide resistance in plant pathogens is beneficial when controlling diseases. First, fungal populations control a small number of resistant isolates. These resistant

isolates occur naturally or are created by various mutagens, including fungicides. Then, the frequency of resistant isolates increases over time through the selection process of repeated fungicide application and migration of resistant isolates as well. How fast does the process take? It depends on the type of fungicides, pathogens, turfgrass species, disease management techniques, and environment. Therefore, the fungicides that used to work best for the control of the particular disease now have reduced efficacy.

The existence of mutant isolates resistant to strobilurins has been known for several years in a range of phytopathogenic organisms. For field crops there are reports on the development of resistance to strobilurin fungicides in some diseases. Through further investigation researchers found that most pathogenic fungi treated with strobilurins develop mutations in two regions of mitochondria. The risk of development of fungicide resistance when edible crops were treated with strobilurin fungicides ranges from low to high depending on the host and pathogen. Furthermore, it is believed that strobilurins might be subject to cross-resistance. That is, if a fungus resists one strobilurin, it

will resist other strobilurins. For example, the dollar spot pathogen is cross-resistant to the benzimidazoles [benomyl (Tersan 1991®) and thiophanate-methyl (Fungo 50® and Cleary 3336®)].

Several other strobilurin analogues are being developed as fungicides for the control of turfgrass diseases. Management strategies need to be developed so that fungicides can remain effective for long periods of time. Keep an eye on any unusual symptoms, or noticeable changes such as the reduced efficacy of control. If you are using these fungicides in your IPM plan and detect any noticeable changes, please let us know. Then we can make a trip to sample isolates for a test of fungicide resistance using the available DNA technology. We have excellent tools such as fungicides and our knowledge to use against our enemies, turfgrass diseases. How to use them skillfully and effectively is up to all of us.

For more information on the history of how the fungicides were first discovered and their mode of action, you can refer to an article about Strobilurins published in the Grass Roots by Jeff Gregos a few years ago (*The Grass Roots*, pages:22-23, March, 1999).✂

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CALS, UWEX Keep UW – Madison Turf Program Moving Ahead



By **Monroe S. Miller**, Golf Course Superintendent, Blackhawk Country Club

Thanks to some favorable decisions from administrators at our land grant college in Madison, the turfgrass program at the institution remains intact and poised to moved ahead. It was scary for a while, though.

The first problem, as explained by Chris Williamson in *The Wisconsin Entomology Report*, was to convince UW – Madison and UWEX staff of the need to return the Koval/Williamson position to permanent position status. Heaven knows we need the help from Williamson now and the looming new pests will present even more formidable trouble in the near future. The turf and ornamental industry simply has to have quick and open access to an Extension entomologist to maintain any semblance of prosperity.

That argument was made by people in the field, by chairs of some of the departments involved with the turf program, by faculty, by end users (golf players) and even by a member of the University of Wisconsin Board of Regents. There is risk in naming names – the fear of leaving someone out is very real. Nevertheless, Dave Hogg and Larry Binning, Elton Aberle and Rick Klemme, and Carl O'Connor especially were key in restoring and funding the Entomology position to permanent status. Dr. O'Connor even visited the GCSAA conference in 2000 as part of his information gathering about the magnitude of our business of golf turf.

The addition of Dr. Geunhwa Jung to the team was a tortuous experience. Where would we have been without Doug Maxwell, Craig Grau, John Andrews and the Dean's office staff working to resolve the plant pathology position? And look how it turned out – Geunhwa is going to do great things for the golf turf businesses in Wisconsin during his career; that wouldn't have been possible without some real hard work and dedication from administrators.

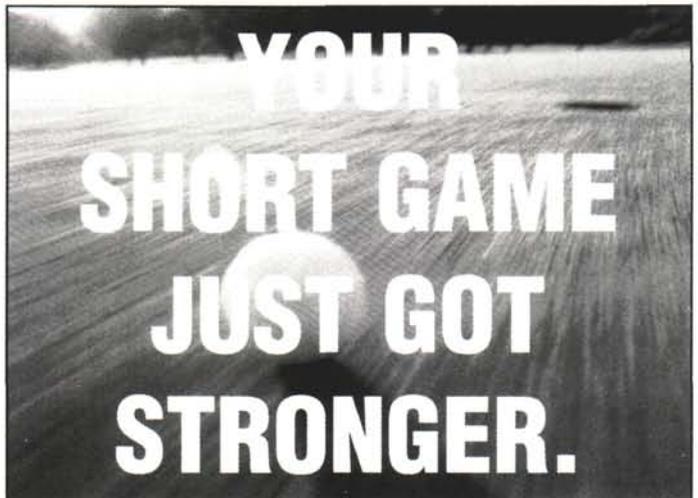
And I am wondering how many of you know of the great opportunity Dr. John Stier had in early summer – he was offered a position on the faculty at Pennsylvania State University that was extremely lucrative. He passed on it to stay at Wisconsin. John, of course, sees the potential at Wisconsin. But he was also aided in his decision-making by Dr. Paul Ludden, Larry Binning (again) and others who know of John's ability and potential and didn't want him to leave. Every time I see John, I am thinking we may never know how close he came to leaving – and didn't!

I am not exactly sure when Wayne Kussow plans on retiring. We can hope "never" but that's foolish. There

aren't many Phds coming out with a soil science background and a turf specialty; I can see a bad moon on the rise. I was thinking the other day as I read Doug Soldat's article in this issue of *The Grass Roots* that somehow a deal should be struck with the "University" that would allow him (assuming he is willing) to finish his PhD and step up to Wayne's job when Wayne does retire. That way, the prof and student could plan course work and research that would match what Wayne thinks would be best for his position. Probably won't happen, but it makes sense and ought to be discussed with someone.

We have a few years of potential stability and tranquility, but that didn't just happen. I guess maybe that is the point I am making in these few paragraphs. We have a pretty good history of involvement and participation and generosity, and it has helped our cause. When you are my age, you can look back and see that.

Let us rededicate ourselves – all of us – to keeping it going. It will be worth whatever effort is required. 🌱

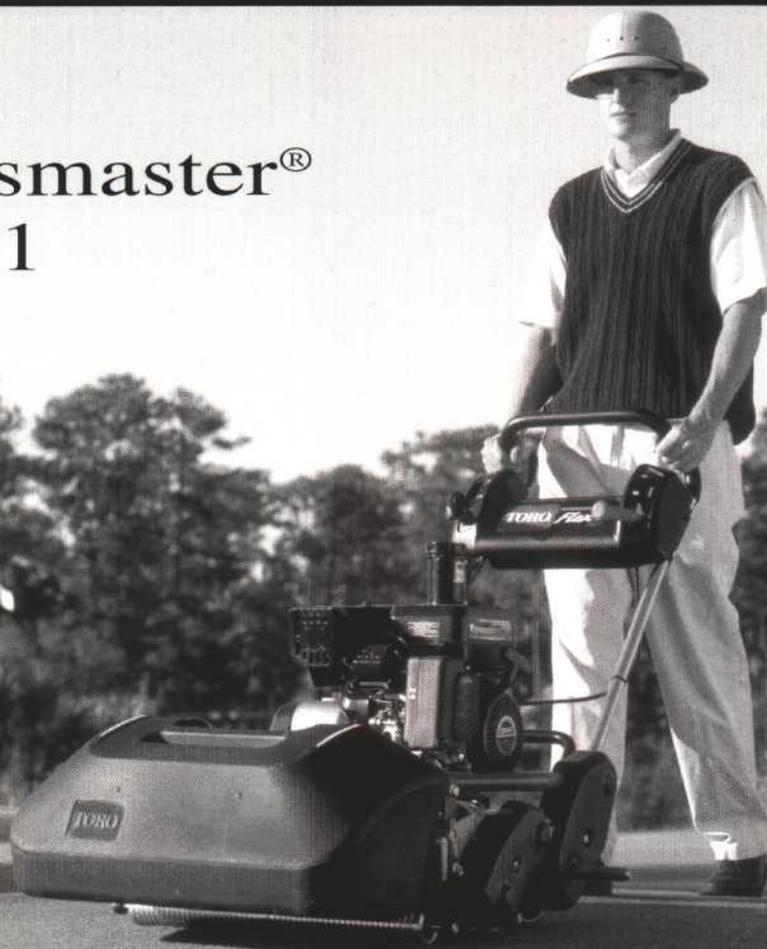


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