of it. We also carried a complete line of other energy efficient products.

"So why did I get out of the business?" Joe rhetorically asks. "I picked the wrong time to be in it – the early to mid 80s when the construction business was really taking a slide. Spent all of our money. Used up all of our capital and investment. Not happy about it, but I did it. Now it's done. I'm glad I did it when I was younger because we were able to recover from it. Took a long time and a lot of hard work for my wife, Pat, and myself, but we did recover."

When he closed the doors to his business in 1988, Joe tried to get a sales job with Horst again. "But they had a full staff at the time, so for the next six years I worked for two other companies that sold turf equipment but were mainly ag dealers – Mid-State out of Columbus and Hanley Implement in Sun Prairie," Joe recalls.

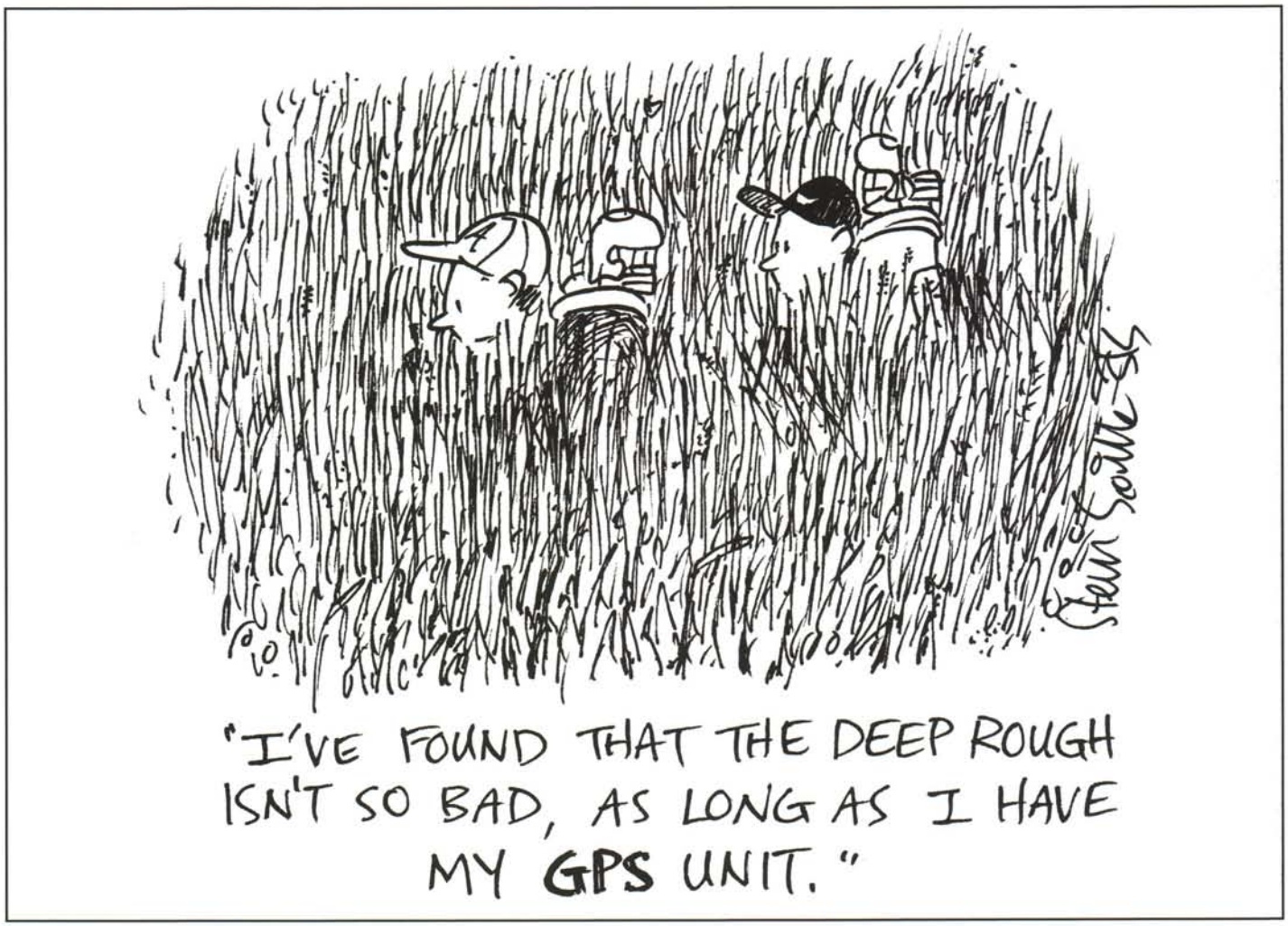
"They were good ag companies, but they didn't operate their turf businesses the way I was accustomed to," Joe remembers. "So I kept trying to get back in with Horst. When my good friend Ron Schumacher retired from Horst in 1994, I went back to work there."

Different and the same...

There are great differences between the territories he has covered for Horst – the south earlier versus way up north today: densely versus sparsely populated; small versus large geographic area; seven to eight versus three months of golf. "They don't have as much time to make or spend money up north. Obviously, it's not as lucrative here as it was in the southern part of the state. But this is the territory that was open."

When it comes to customers, though, there are no differences. "I thoroughly enjoy the customers in both places," Joe says. "There are some of the greatest people in the world up here. I have some great friends in southern Wisconsin, too. And I try to give all customers the same treatment, no matter how much business they do with me."

Having worked in the turf industry for many years, Joe has witnessed a few changes. "The machinery is so specialized now,



very technical, very precise," he says. "Years ago we had about five machines to sell – a fairway gang mower or an F10. Now we can give people a choice of seven different fairway mowers, many different rough mowers, and many different greens mowers. We sell 21 different models of bunker rakes today. Years ago, we had one.

"The changes in turf – if I were to wake up after a 20-year sleep, I'd probably be taking a 9 iron off of the tee and chipping onto this big, long green – which is actually the fairway now," Joe jokes. "The fairways are maintained like our greens were back then. Not quite, but close."

Super's job is very demanding...

"The customers – extremely talented people before, and likewise today," he continues. "But a greater number of customers are more educated today. The superintendent's job is very high-pressure. They are responsible for the happiness of all of those golfers who get one or two days a week off and go to the golf course to blow off steam and relax. If the golf course is in lousy shape, you've really ruined that guy's week.

"I really do give credit to all superintendents everywhere," Joe adds. "It's a very demanding job. My job is very demanding, too, but not as much as a superintendent's job. There are things that they *have* to do. There are things that I'm *supposed* to do. If my work didn't get done today, it wouldn't be the end of the world. But it would be for them."

One worry that Joe had as a business owner, and still has as a territory sales manager, is not knowing what his financial outcome will be each year; there's no regular paycheck like there is with a superintendent's job. "If my customers don't buy from me, I don't get paid," he says. "I guess I've always worked on commission. It can be scary at times. If the economy goes down, people stop buying. When that happens it's kind of like working all week without being paid in the end."

When he's not making miles...

When Joe isn't on the road, he enjoys spending time with his family. "I tell people I've always been married, but it seems like only a few years," he says. Joe's

wife, Patty, works part time as a pharmacy technician. "She is a great gal and has put up with my nonsense for all these years – and there has been plenty of that and much more to come! Even with all that, I think she still misses me when I'm gone – although she has always claimed that I cannot ever retire because I do drive her nuts. I am always on the go at home and rarely sit down."

They have two children and five grandchildren to visit. Joe, Jr., lives in Spring Grove, Minnesota with his wife and three children. Mary Jo lives in Markesan with her husband and two children. Joe, Jr., is in the radio business while Mary Jo is an office manager and college student.

If he weren't gone so much, Joe would spend more time fishing, boating, swimming and working in his yard. "I love early and late evenings. I live on a lake and probably get a chance to fish twice a year," he points out. "When you're gone all the time, you can't get much work done at home. A person who comes home every night can mow his lawn one night and weed his flower beds the next night. I don't get to do that. All the things one does each evening I must do on the weekend.

"My health has always been good, although I've had a couple of industrial accidents this fall and winter," Joe reports. "In one I broke seven bones and in the other I injured my knee. After a bout with blood clots and my leg being locked up in a 45 degree position for five weeks, they were finally able to operate. Hopefully everything is fixed now and I am on the heal."

Joe has no plans to retire in the near future. But when he does retire, he won't disappear. "I can't imagine me ever not being in the turf business," he says. "I can't imagine getting old, retiring, and not visiting with all the people I know. I can't imagine just retiring and never being seen again. So that's a warning. Sorry guys, but you're not going to get rid of me."

Even in retirement, Joe will have "Miles to go before he sleeps, miles to go before he sleeps."

2002 Symposium Will Bring Advice on "Doing More With Less"

The downturn in the U.S. economy coupled with a large number of golf opportunities available to today's golfer have challenged Wisconsin golf course superintendents to tighten the budget belt. The economic situation has inspired the topic for the 2002 Wisconsin Golf Turf Symposium: *Doing More with Less – Resource, Time and Money Management*.

The Symposium will be convened at The American Club in Kohler for the second consecutive year. The dates are November 12 and 13.

Speaker invitations have been made, and we have a number of commitments in hand.

Dr. Mike Hurdzan will return to Wisconsin. A high profile golf course architect, Mike is well known for his design work and has received numerous awards in areas of environmental sensitivity and cost effective construction. He is also the author of the popular and widely read book, *Golf Course Architecture*.

The maestro of the popular on-line TurfNet, Peter McCormick, will be with us and will keynote the Symposium on "Can Computers Get You More For Less?" His presentation will include a discussion on the role of e-commerce and chat lines in the industry. As he does so well on TurfNet, he will also provide insight into areas we often overlook and take for granted in the rush of business.

Bob Graunke, golf course superintendent at TideWater Golf Club in Myrtle Beach, SC, works for a management company and will share his experiences in the golf business and tell of what a management company looks for on the golf course and how it affects the bottom line. Bob is going to discuss "value of money" issues we may be missing in our more traditional roles.

Bruce Williams, superintendent of Los Angeles CC, will present a condensed version of his GCSAA seminar, "Time Management for Superintendents."

A panel discussion among WGCSA members Mike Semler, Mike Drugan and Marc Davison will focus on "Tightening the Belt."

Additionally, the subjects of written maintenance standards and lease vs. purchase of equipment will be addressed. We are waiting for speaker confirmations on these topics.

The highlight of the WGCSA educational program each year is the Symposium; 2002 will be no different. Now is the time to plan to attend.

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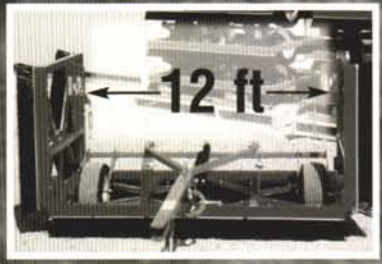

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Pink Snow Mold Research In Wisconsin!

By Yolibeth Rangel and Dr. Geunhwa Jung, *Department of Plant Pathology, University of Wisconsin-Madison*

This month, continuing with the introduction of researchers that work in Dr. Geunhwa Jung's lab, Mrs. Yolibeth Rangel will talk about her research with pink snow mold.

I came to the United States for the first time during August of 2000. I was born and raised in Venezuela, where I obtained my undergraduate degree in Agronomy Engineering and then continued on for my Masters in Agronomy with a major in Plant Pathology. I knew nothing about golf, not even about turfgrass, until I began to work in Dr. Jung's lab. My prior work was with diseases in sorghum and rice, which are also grasses, but very different from turf. During these past two years of working with turfgrasses, the diversity and beauty of this crop have amazed me. I cannot imagine how the gardens would be without at least a little space cover by lawn or how any "outdoor architecture" might exclude turfgrass.

Since I am a phytopathologist, the first thing that came to my attention was diseases of turfgrass. I started to work in this lab first with *Typhula* spp and then with *Microdochium nivale*, both fungal pathogens causing the popular snow mold diseases. The most interesting thing about these pathogens is the fact that they affect grasses under such a harsh condition, something that one who does not live in temperate regions (I came from a tropical country and had not really experienced snow) can barely imagine. Working with this kind of microorganisms has allowed me to gain new knowledge that I did not know before. So I am glad to have this opportunity to write for this magazine and share a bit about my research and what I have learned.

Most of you have seen pink snow mold growing in your own lawn. It is a common disease in northern regions of the United States and Europe and is the most important disease of turfgrasses after *Typhula* snow molds. Its causal agent, the fungus *Microdochium nivale*, can affect virtually all grass species and can cause symptoms in turf twice a year, during spring and during fall. During the latter, the symptoms appear distinct from pink patches and the disease is called *Fusarium* patch. It is somewhat confusing that any of these names correctly describe the disease, however they are all appropriate and originated because of varying symptoms. The first major confusion is that the pink color appears only under certain conditions. If there is snow cover, the patches may appear whitish-gray or reddish-brown. However, without snow cover the patches can be seen as reddish-brown. Secondly, the disease is not confined to snow-covered turf, and often occurs during wet and cool fall seasons. Thirdly, the fungal species does not belong to the *Fusarium* genera (the name *Fusarium nivale* was reassigned to *Gerlachia* and then to *Microdochium*). So, do not be fooled by the meaning of the name if you try to determine what those patches on your turf are. Whatever the disease is called, it is likely you could have pink snow mold on your turf if extended cool and wet weather occurs in your area, even though the patches are not pink.

What has happened with snow molds this year? Did you notice any difference? As my lab mate, Elizabeth Scheef pointed out in the last issue of the *Grass Roots*, many golf courses did not show any symptoms of *Typhula* snow mold. However, during her trips throughout Wisconsin collecting snow mold samples over the last two months, she did observe many pink patches in the majority of the golf courses she visited. As explained above, pink snow mold is not limited to regions covered with snow, which differs from *Typhula* snow mold caused by *Typhula* spp. that does require a lengthy snow cover. Pink snow mold is a problem in any area with cool and wet weather in both spring and fall. In

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addition, alternate thawing and snow cover, repeated frosts, and/or cold fogs are very favorable for the development of the disease. You may have noticed these types of weather over the past winter, which although unfavorable for *Typhula*, are terrific for pink snow mold.

Pink snow mold, like many other diseases of turfgrasses, is managed almost completely by the use of fungicides. However the fungicides used to control pink snow mold often differ from those effective against *Typhula*, which means that in some cases (depending on the fungicide type) a mix of different products needs to be applied for the control of both. Some cultural practices, such as balanced fertilization, are also useful for reducing the damage of the snow molds. However, one of the best options for an integrated management of not only pink snow mold, but also other diseases, is the utilization of resistant cultivars. Yet, these sources of resistance are not easy to be found or to be incorporated in breeding programs. Resistance to snow mold in turf has not been investigated at all. That is why one of our main research goals as scientists in the Wisconsin Turfgrass Research Program is to develop new turf cultivars resistant or tolerant to snow mold pathogens, which are major problems in the Midwest. However, to achieve that goal, we must go through several time consuming steps, something that the team of scientists led by Dr. Jung has already begun.

Many aspects of *M. nivale* have been investigated so far. In general, the factors affecting development of the disease, such as the source of inoculum, temperature, moisture, snow cover, soil pH and plant nutrition, have been described. However, the diversity of the fungus among the different environmental conditions in many northern areas, as well as in different plant genotypes, remains to be investigated in turfgrasses. The majority of investigations of the genetic variability of *M. nivale* has been done in wheat, where two different varieties of the fungus have been described: *M. nivale* var. *nivale* and var. *majus*. While searching the literature to determine if these varieties occur on turf, I found only one investigation, which was done in Canada. The Canadian researchers concluded that there is no *M. nivale* var. *majus* in turfgrass. However, the area they sampled was limited and possibly quite homogeneous. But what happens here in Wisconsin where over 500 golf courses are found, where environmental conditions and cultural management of turf varies from south to north and from west to east, and where many different species and cultivars of turf are used? It is known to scientists working in plant pathology that environmental conditions, plant genotypes and human beings are responsible for the change of microbial populations. These three cause pressure on particular pathogen species or isolates which are naturally selected to survive under the specific conditions created by those factors. This is exactly what happens when you apply a very effective fungicide repeatedly that controls most of the fungal population, yet a few survive because they were genetically resistant to the product. After awhile, the surviving individual dramatically grows in number and you see your plants infected again by the disease even though you apply the higher doses of the fungicide.

In the case of pink snow mold, evidence of differential host preference between var. *nivale* and *majus* was reported in wheat, rye and oat, where for example var. *majus* hardly caused disease on rye while var. *nivale* caused many symptoms. So, if that is happening in those grasses, how about turfgrass? We all know that turf in a golf course is composed of different turfgrass species or different cultivars of a same species. Can the genetic diversity of turf within and among the golf courses generate a selection pressure on the fungus? Moreover, if that is true, how does it affect the management of the disease?

With those questions in mind, we began a project designed to achieve the following objectives:

1. To understand the genetic diversity of the *M. nivale* population occurring on turfgrasses in Wisconsin.
2. To identify the varieties of *M. nivale* that might be present in turfgrass in Wisconsin.

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To accomplish the above goals, we collected samples of pink snow mold from 100 golf courses all around Wisconsin during the spring of 2001. This work was done at the same time when we collected *Typhula* snow molds. As Elizabeth explained in her last Grass Roots article, the golf courses visited represent different temperature and snow cover duration zones in Wisconsin. At each golf course, we collected one to two pink snow mold samples from each of four randomly selected fairways. Then all samples were processed in our lab. For each sample, two isolates, originating from one single spore each, were selected for our studies. After the fungal isolates have grown, we extract the DNA from them and, using a molecular technique, we examine the population diversity of the fungus. This is similar to surveying a group of people from a specific area (say a county) to determine how diverse the human population is in terms of, say, a blood type.

Why is this information so important or useful for you? If you think about the blood type, it can tell you about how many people with each of blood types and how hard to find a specific type. This allows the people working in hospitals in that county to plan a strategy for collecting and storing blood types for an emergency. In our case, knowing how diverse the fungus *M. nivale* is and then knowing how its diversity influences the management of the disease, will allow us to develop a more effective strategy for control of pink snow mold. It could be, for example, that the fungal isolates on one course are genetically distinct from an isolate on another course and that the efficacy of a specific fungicide, therefore, differs on the two courses. Also, for researchers, it is useful to know how different isolates of the fungus specifically affect the various species/cultivars of turfgrass. This will permit us to make further steps in developing turfgrass cultivars resistant to pink snow mold. In conclusion "you need to know the enemy if you want to win the war."

So far, the analysis we have made of approximately 100 pink snow mold isolates has shown the presence of only *M. nivale* var. *nivale*. Yet, we are going to analyze more samples and continue other experiments to obtain a conclusive, comprehensive picture of the population structure of this fungus. I hope this study, as well as all the studies that are being conducted in our lab, will help design better management alternatives that will reduce fungicide applications, environment contamination, and one of your main headaches, snow mold diseases.

Should I Be Balancing Soil Cations?

By Sean P. Hearden and Brian J. Pyszka, *Department of Soil Science, University of Wisconsin-Madison*

As the turf industry continues to expand and new products are being marketed, it's becoming easier and easier to get confused by manufacturers' claims. There are scientific reasons behind every claim made, but it is left up to the consumer to discern whether or not it is "good" or "bad" science that supports a company's assertion. One hot topic in the area of soil fertility is the BSR (Base Saturation Ratio) theory. This is a fertility practice that has been researched since the 1890s by many qualified soil scientists largely on legume crops. The idea behind the theory is that if the base cations (Ca, Mg, K, and Na) are present in the correct saturations of soil cation exchange capacity (CEC), the pH of that soil will automatically adjust itself to 6.0 to 6.5, a range in which all soil nutrients are highly available. The BSR theory recommends that the base cations take up 80% of a soils CEC and that the concentrations of these cations with respect to each other in soil should be in the following ranges: Ca, 65 to 85%; Mg, 6 to 12%; K, 2 to 5%; and Na, 1 to 2%. The remaining 20% of the CEC should be occupied by hydrogen (Albrecht and Smith, 1951). In recent years, this has become a popular soil fertility management practice for turfgrass. In spite of its popularity, there is quite a bit of research that suggests that it is not at all necessary in the management of turfgrass. The remainder of this discussion will look deeper into this research and research just concluded by Brian and myself under the guidance of Dr. Wayne Kussow in order to determine the relevance of BSR theory in bentgrass establishment.

The Evidence

Though there are several studies available that could be discussed, we'll limit our discussion to two of these studies. The first of these studies was conducted at Ohio State University by Eckert and McLean (1981). Here, a single soil was treated in several different ways so as to provide a wide range of base saturation ratios for the growth of German millet and alfalfa. The second study is the one reported here, conducted in the spring of 2002. Our research was conducted in the greenhouse and used four different putting green root zone mix amendments to grow creeping bentgrass.

The Eckert and McLean (1981) study divided their results into two categories: highest yield and lowest yield. There was little variance in yield within each of the two categories. They then pitted the soil properties of each group against each other and found that there was not a distinctive set of base saturation ratios coupled with either high or low yields. They also found that soils with the same set of properties may produce high or low yields (Eckert and McLean, 1981). These results indicated that crops act in response to amounts of exchangeable base cations rather than their percent saturations.

Our research builds upon Eckert and McLean's (1981) findings. Our four treatments consisted of pure calcareous sand and three treatments of calcareous sand amended on an 80/20 (v/v) basis with each of these materials: peat, porous ceramic, and zeolite.

Table 1: Base cation concentrations in each treatment.

Treatment	% Ca	% Mg	% K	% Na
Sand	58	18	20	5
Sand + Peat	53	22	17	3
Sand + Porous Ceramic	47	18	32	3
Sand + Zeolite	17	7	26	50
BSR Recommendations	65 to 85	6 to 12	2 to 5	1 to 2

Table 2: Nutrient concentrations in plant tissue.

Treatment	% Ca	% Mg	% K
Sand	0.74	0.45	2.4
Sand + Peat	0.69	0.37	2.36
Sand + Porous Ceramic	0.58	0.37	2.57
Sand + Zeolite	0.79	0.48	2.61
Recommended	0.25 to 0.5	0.2 to 0.4	1.75 to 2.50