agriculture grew exponentially as a result of the UW helping a group of its citizens. Another example of how the UW won support of citizens happened in the mid-1890s. Professor Harry Russell, a bacteriologist in the College of Ag, was asked by a pea canner if he could figure out why tin cans of vegetables would explode and, worse, why there were too many cases of food poisoning. Russell went to the canning factory, studied the canning process, identified a bacteria that was producing a gas, determined how much heat was required to kill the organisms, and advanced the canning industry in Wisconsin. We are still one of the largest vegetable canners in the country. It was classic—a professor helping solve a problem of citizens, just like Dr. Maxwell's help for Gary Tanko. In fact, Dr. Maxwell's office in the Department of Plant Pathology is located in Russell Labs, named after the same Harry Russell.

I was a beneficiary of The Wisconsin Idea at a very young age. Like many thousands of other rural kids in Wisconsin I attended a one-room school. It's hard to believe that a guy as young (!) as I am had such an educational experience—one teacher teaching all subjects to kids in all grades in a single classroom, grades one through eight. Once a week we listened to WHA radio, broadcasting from the University of Wisconsin campus in Madison, to get some training in music. One-room school teachers gave us the basics; extras were taught by Wisconsin professors over the radio. It was The Wisconsin Idea in action.

Another experience came at an early age. Most country kids belonged to a 4-H club; I was no different. Most counties had a 4-H agent—a staff person in UW Extension. And when I showed a Guernsey calf at the Fennimore Community 4-H Fair, a faculty from the UW judged the animals. It was my first exposure to a prof; who could forget it? It was The Wisconsin Idea at work.

Like most of you, I've experienced much help from the UW-Madison and UW Extension as a golf course superintendent. The turfgrass extension meetings, the Turf EXPO, meetings like our October WGCSA gathering when Dr. John Stier came to visit with us, visits from Gayle Worf to help with golf course disease problems, Extension bulletins, Grass Roots articles written by faculty, Gregos' and Stier's visits to Lambeau Field, Rossi and Kussow giving a seminar on winter injury to club officials from all the courses in town, etc., etc.

The Wisconsin Idea obviously has been widely copied and that is good. And it has several other and different meanings, but the most enduring one for me has been the one that has connected Wisconsin golf course superintendents to the applied problem solving, technical assistance and educational abilities and talents of the University of Wisconsin. It gives us access to education and research, and that in turn improves golf in Wisconsin. That is the very fabric of The Wisconsin Idea. It has given us a broader and better working world.

Just ask Gary Tanko.

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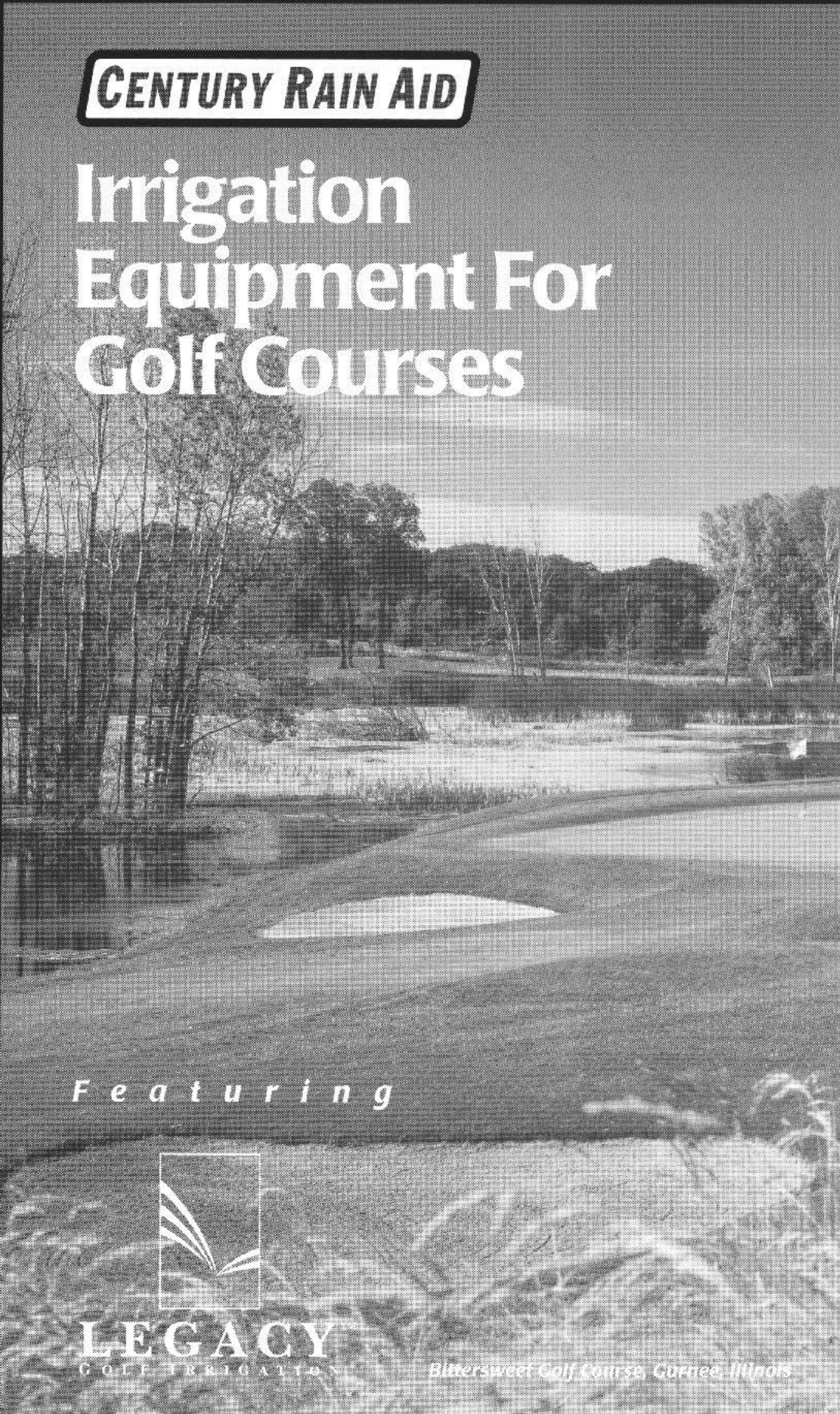

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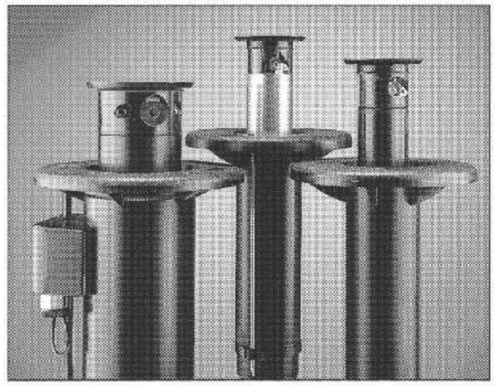

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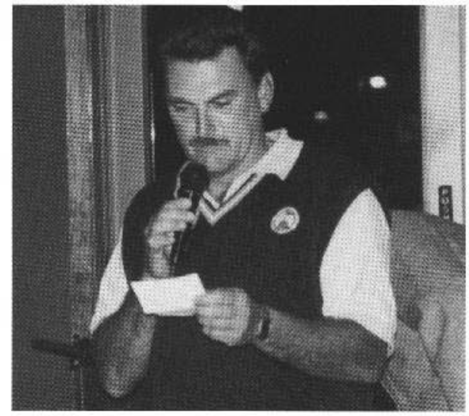
SEPTEMBER MEETING AT THE WOODLANDS

Mike Berwick, superintendent of The Golf Courses of Lawsonia, hosted the September WGCSA tournament meeting. The Woodlands Course was the setting for the 108 superintendents and affiliates in attendance. Green Lake is one of the finest resort locations in Wisconsin and Lawsonia is obviously one of the reasons. Mike and his staff keep this 36-hole resort in top condition throughout the season.

The tournament consists of an A flight and a B flight. The winner of the A flight, shooting a gross score of 83, net 70, was Koshkonong Mounds superintendent Brent Amann. Second place was taken by Scott Bushman, superintendent of Fox Valley CC, shooting 80 for a net 74. Flight B was won by Dave Van Auken from Timberstone GC with a gross score of 100, net 71. Flight B second place was taken by Edelweiss Chalet CC superintendent Dick Buetel shooting a 110 for a net 72. For affiliate members, guests, and members without an established handicap a separate Peoria tournament is played. The Peoria flight was won by Todd Klimke with a 55, and second place with a 59 was Dan Shaw.

After golf everyone reconvened at Norton's Marine Dining Room on the shore of Green Lake for dinner and the annual "Year in Review" by USGA agronomist Bob Vavrek. As always Bob's presentation of the interesting things he encounters during the year was excellent. One cannot help but feel pretty fortunate after seeing the slides from the Red River flood in Fargo, SD. Water at 57' over flood stage leaving fairways under water for 4-5 weeks seemed to minimize the heavy rains we experienced this spring. Bob's full length version of his "year in review" can be seen at the symposium in November.



Host Mike Berwick.

Better Grasses by Breeding: Section I

By Dr. John C. Stier,
Department of Horticulture
University of Wisconsin-Madison

Introduction

Grasses originated long ago, probably about 70 million years ago during the Age of Dinosaurs in the Cretaceous and Tertiary periods (Harlan, 1956). Most of our cool season turfgrasses evolved much later under consistent grazing pressure at the margins of forests in Europe/Eurasia during the Pliocene and Pleistocene epochs (Beard, 1973). The only turfgrass species native to the Americas is buffalograss (Buchloë dactyloides), a native of the shortgrass prairie, which evolved under grazing pressure from the American bison (Bison bison).

The turfgrasses used at present are vastly different than those available sixty, thirty, and even ten years ago. During the past half century tremendous strides have been made by relatively few breeders: their programs result in continuously new cultivars and have even added new species to the list of acceptable turfgrasses within the last 20 years (e.g., perennial ryegrass, tall fescue, rough bluegrass).

Why Breed?

Humans have a penchant for consistently demanding superior products. Products considered wonderfully advanced yesterday become archaic the next, thus, people want ryegrasses with continuously better color, tall fescues with continuously finer texture, etc. In addition, new races of pathogens constantly evolve and can overcome the resistance of an improved cultivar over time.

The earliest selections of superior turfgrass strains were performed by J.B. Olcott in Connecticut and W.W. Beal at Michigan State Ag. Exp. Station (now Michigan State University) towards the end of the 19th century. The first real breeding efforts, though, were not instigated until several golf course superintendents pushed for the establishment of a turfgrass research program at Pennsylvania State College (now University) in 1928. The program was initially headed by H.B. Musser, a former legume breeder. Musser was followed by Dr. Joe Duich in 1959 who has made invaluable contributions of new turfgrass cultivars, especially bentgrasses. In the south, Glen Burton at the University of Georgia began breeding warm season turfgrasses in the late 1940's. In the early 1950's Dr. Burton produced the first hybrid bermudagrasses (Cynodon dactylon x C. transvaalensis), 'Tiflawn' and 'Tiffine' (Burton, 1992).

How Varieties are Developed

"Fortune favors those prepared" is seldom truer than when turfgrass breeding is involved. Although the commercial release of a new cultivar involves years of painstaking evaluating, backcrossing, sorting, and seed production, most new cultivars started out as a single plant which was outperforming its neighbors in a turf stand. In 1936, Joe Valentine of the Merion Golf Club in Pennsylvania, noticed a Kentucky bluegrass plant which did not seem to be affected by leafspot disease (Drecshlera poae) (Burton, 1992). By 1950 the first improved variety of Kentucky bluegrass was available, and to date over 70 million lb of 'Merion' have been sold due to its leafspot resistance. Prior to 'Merion', leafspot was THE major disease of Kentucky bluegrass. Unfortunately, 'Merion' is susceptible to stripe smut and the patch diseases so is no longer a prime cultivar. Nonetheless, some degree of leafspot resistance has now been bred into many of the Kentucky bluegrass cultivars now available.

Development of a new cultivar requires time, patience, money, and more time! The release of a new cultivar may take up to 10 years from the time the original germplasm is collected. Once unique plants are collected from the field (often from old cemeteries or golf courses), they are "increased" by growing them in the greenhouse. They are then cross-pollinated with plants having other desirable traits (e.g., fine leaf texture). The resulting seed is then grown, and the progeny ("children"; sometimes called the F1 generation) is evaluated. Promising F1 plants may then be backcrossed (cross-pollination with the parents) to produce the F2 generation to ensure genetic stability. Several more generations may be produced by additional backcrossing or outcrossing with yet more plants. At some point, the best plants are selected for field evaluations. After several seasons of field evaluations, the best plants may be allowed to grow to maturity and produce Breeders Seed. This becomes the original seed source for all future development. Some of the Breeders Seed is planted to produce Foundation Seed the next year; the remainder will stay with the breeder. The Foundation Seed is always bagged with a white certification tag and is then planted by seed producers to grow seed for sale. If the amount of Foundation Seed is small, the crop produced by the Foundation Seed may be tagged as Registered Seed. The Registered Seed (purple certification tag) will then be used to increase the seed quantity sufficient for commercial purposes. Otherwise, seed produced from Foundation Seed can be sold to consumers as Certified Seed (as long as the production fields and seed lots pass inspection by the seed certification commission of the state) (Figure 1). Certified seed labels are often blue or white, however, not all seed is certified. Non-certified seed may have a low germination rate or too many weed seeds to allow certification.

Desirable plant is found →	Increased in greenhouse →	Crossed with other plants →
Year 1	*Year 1*	*Year 2*
Several more crossings may be performed →	Greenhouse valuations →	Field evaluations
Years 2+	*Year 3*	*Year 4+*

Breeders Seed →	Foundation Seed →	Registered Seed (optional) →	Certified Seed
Year 5	*Year 6*	*Year 7*	*Year 7 or 8*

Figure 1. The long path to commercialization of a new cultivar.

Currently there is interest and even preliminary trials using biotechnology to add specific genes to turfgrass plants to achieve certain characteristics (e.g., glyphosate resistance). More will be written about these techniques and developments in a future installment of the turfgrass breeding series.

The Link to Forages

Many of our cool season turfgrass varieties were developed from forage grass varieties. Tall fescue (Festuca arundinacea) is a classic example. The first varieties released for turf use were 'Alta' (1940) and 'Kentucky 31' (1943) (Hanson, 1965). Prior to this, tall fescues were considered too coarse for use as a turf. Today, 'K-31' is considered ancient, and is undesirable as new, finer textured cultivars of tall fescue are available. The severity of droughts in the midwest during the late '80's and the early 1990's, along with increased concern over irrigation, gave tall fescue breeding a jumpstart. Ten years ago there were few tall fescue varieties available. In the latest National Turfgrass Evaluation Program (NTEP) trials, there were over 100 entries submitted by most of the major seed companies! Some of the newest advances have been made in darker green color, low growing height (the dwarf types), and endophyte enhancement (Acremonium spp.) for insect/disease resistance.

Perennial ryegrass (Lolium perenne) is another latecomer to the turfgrass world, also developed from forage varieties. In the past, tough fibers in perennial ryegrass leaves made mowing difficult and often resulted in a shaggy appearance to the turf. While this problem is still present, it is greatly reduced compared to the forage types. In Britain, where it has been used for forage for over 300 years, various strains range from short-lived stemmy types to long-lived, leafy types (Meyer and Funk, 1989). Although the stemmy types are excellent seed producers (e.g., 'Linn', 'Victoria'), the perennial leafy types were first noted for their ability produce good athletic turf surfaces. The development of 'NK-100' by Howard Kaerwer at Northrup King in the mid 1960's signaled the beginning of the widespread use of perennial ryegrass for overseeding warm-season turf in the U.S. (Meyer and Funk, 1989). Its rapid germination helped its popularity in many turf situations. In 1967, Dr. Reed Funk released 'Manhattan' perennial ryegrass for cool season turf use. Developed from a plant Dr. Funk found in Central Park, 'Manhattan' has been the most popular perennial ryegrass cultivar to date. New crosses of 'Manhattan' have resulted in 'Manhattan II' and 'Manhattan 3'. Like tall fescue, newer cultivars boast finer leaf texture and darker color. Many cultivars are suited for mixtures with Kentucky bluegrass where they help improve wear tolerance of the turf. Certain cultivars accept low mowing heights of 0.5 inches and are used as fairway turf. Unfortunately, because most breeding efforts have been focused on improving the agronomic qualities of perennial ryegrass, diseases are still a major limitation to

(Continued on page 17)

(Continued from page 15)
their use in many instances, particularly brown patch (Rhizoctonia solani), Pythium blight (Pythium aphanidermatum), and crown rust (Puccinia coronata). Breeding endophytes into perennial ryegrasses is being attempted.

Breeding Programs

At the University of Wisconsin we are devoted to improving turf quality for all turf managers and users. One of the exciting new projects we are embarking upon is the development of a turfgrass breeding program. Most turfgrass breeding is performed by private companies, generally in the Pacific Northwest. A few universities in the U.S. also have turf breeding programs, some of exceptional quality due to numerous varietal releases over the years (e.g., Rutgers University, Pennsylvania State University, University of Georgia, Texas A & M, and the University of Nebraska). Breeding of cultivars under one set of environmental conditions, however, does little to ensure success of the cultivar in other regions. One of the reasons for establishing a breeding program at the UW is to develop varieties particularly suited for the Wisconsin climate and soils. Initially, the program will focus on fine fescues, annual bluegrass for putting greens, and creeping bentgrass. The program at the UW will be headed by Dr. Michael Casler from the Agronomy department. Dr. Casler has been a forage grass breeder at the UW for 17 years and has successfully released several varieties, notably bromegrasses with recent work also on meadow fescues (another potential turf species).

Future installments of this series will focus on breeding of creeping bentgrasses and biotechnology in turf breeding.

Beard, J.B. 1973. Turfgrass: Science and culture. Prentice-Hall, Englewood Cliffs, NJ.

Burton, G.W. 1992. Breeding Improved Turfgrasses. p. 759-776. In D.V. Waddington, R.N. Carrow, and R.C. Shearman (ed.) Turfgrass. ASA monograph 32. ASA, CSSA, and SSSA, Madison, WI.

Harlan, J.R. 1956. Theory and dynamics of grassland agriculture. D. Van Nostrand Co., Princeton, NJ.

Hanson, A.A. 1965. Grass varieties in the United States. ASDA Agric. Handb. 170. U.S. Gov.Print. Office, Washington, DC.

Meyer, W.A., and C.R. Funk. 1989. Progress and benefits to humanity from breeding cool-season grasses for turf. p. 31-48. In D.A. Sleper, K.H. Asay, and J.F. Pedersen (ed.) Contributions from breeding forage and turf grasses. ASA Spec. Publ. 15. ASA, CSSA, and SSSA, Madison, WI.

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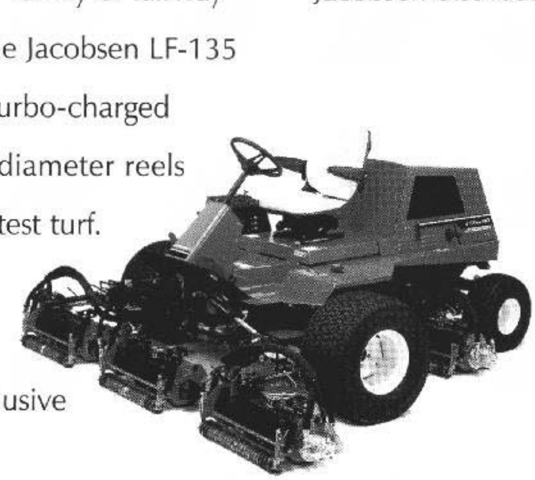

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RESTLESS IN MADISON

Jeffrey S. Gregos
Department of Plant Pathology
Turfgrass Disease Diagnostic Lab
University of Wisconsin-Madison

Since I started receiving THE GRASS ROOTS about a year ago, I have made it a habit to read the entire publication from front to back. In review of these articles, I have found that some provide enlightening words, some provide research data, and others are written to provide a spark for some change, and that is why I am writing you today.

It has recently come to my attention that the Vice Meyer position is no longer. This information was provided to me by two high ranking officials within the University System. So what does this mean for the turfgrass industry? The way I see it, this is adding salt to an open wound. But, as a University employee I have no say in the matter, so I am asking the members of the turfgrass industry to voice their opinion.

In the time that I have been here I have not seen any recent figures on the condition of the turfgrass industry within the state. However when comparing this state's turfgrass industry to those of other states I would have to say that it is at least a $1 billion a year industry. With this in mind I feel that it would be very hard for the State Legislators to say no to such a lucrative supply of tax dollars. Yes, I said State Legislation. I know that this is a dirty word to some, but everybody's worst fears have come true.

The state government is placing its resources on K-12 education, tax relief, and the prison system. Where is the University System in the plan for the state? Over the next year the College of Agricultural and Life Sciences may have nine retirements. Also, during the next year only two faculty positions may be released, and the College's agenda gives priority to positions with major teaching appointment, which the Vice Meyer position does not include. So what is the next turn?

With conversation with members of the WTA board, I have found that their by-laws prohibit them from lobbying. As for the WGCSA, I am not sure. But, something has to be done before the University and legislature feels that the Wisconsin Turfgrass Industry can do without such a position. Yes, the TDDL can provide diagnosis and conduct field trials, but we are in a society with negative views of our industry. For this to change we need to provide research that can help reduce chemical input through the implementation of new pest management practices. Without such a position this research is neglected.

So what can be done. Their are probably two possibilities that I can think of. One is that the state redirects some funds to pay for the cost of the position. I don't think hell froze over yet! Another possibility is to establish a check-off system that Dr. D. Maxwell proposed at the Expo last year. With a check off system the ultimate consumers would help pay for the needed turfgrass research. It could be set up in such a fashion that a few cents or a fraction of a cent can be charged for every round of golf, every square yard of sod sold, or every acre of turf fertilized. With such a system the consumer, not the sellers, would pay for the research. With such a system enough money would be raised to support a turf pathology position and additional money for other entities of turfgrass research.

These are only suggestions and may not be the right answer, but I hope the take home message is that something needs to be done, as this situation will not rectify itself. With a united turfgrass industry I feel that our legislators would be hard pressed not to listen.

Rhizocs of Turf

By Steve Millett
Department of Plant Pathology
University of Wisconsin-Madison

The fungus *Rhizoctonia solani* was the first turfgrass fungal pathogen that I studied. It was also the focus of my masters degree at Clemson University, South Carolina under the tutelage of Dr. Bruce Martin. Needless to say, I have a strange fondness for this fungus. *Rhizoctonia solani* is the cosmopolitan pathogen that causes Rhizoctonia blight. It has been recorded as a disease of more than 100 grass species including 12 species of turfgrasses (5, 15). Since F.W. Taylor coined the term "brown patch" for the turfgrass disease caused by *R. solani,* there have been many gains in the understanding of this pathogen and disease. However, until recently *R. solani* was believed to be the sole representative of the genus to function as a turfgrass pathogen. Recently characterized Rhioctonia species pathogenic to turfgrasses include *R. oryzae, R. zeae* and *R. cerealis.* In this article I will introduce you to these turf Rhizocs.

Rhizoctonia solani was first identified as a turf pathogen in 1916 (15). The story leading to its identification began when Fred W. Taylor transplanted a Connecticut-grown red fescue sward around his home near Philadelphia (14). The grass looked great in Connecticut, but quickly deteriorated in the heat of Philadelphia. In the summer of 1914, the turf began to die in large "brown patches" (7). Mr. Taylor went to Washington for help and found the assistance of C.V. Piper and R. A. Oakley of the Arlington turf gardens. Two years later, Piper identified the causal agent of the "brown patches" as the fungal pathogen *R. solani* (15). However, some did not readily accept that the fungus was the cause of the brown patch symptom, and in 1926 John Monteith (1923 UW Plant Pathology graduate #54) offered proof to convince golf course superintendents that the disease was not caused by spiders; that the web-like threads were the mycelium of the fungal pathogen *R. solani* (12, 13). Today Rhizoctonia blight is still one of the most damaging diseases of the cool-season turfgrasses ranging from the Midwest to the East Coast including tall fescue, perennial ryegrass and creeping bentgrass (16).

Close observation of the *R. solani*-like fungi associated with typical and atypical Rhizoctonia blight symptoms has revealed that some isolates may be morphologically similar to *R. solani,* but in reality, are quite distinct species (2, 3, 6, 9, 11). In 1980, Burpee reported that R. cerealis, a binucleate species, was the causal agent of yellow patch disease (2). The few yellow patch cases that I have seen in Wisconsin were ephemeral and caused little damage. However, that doesn't mean that it canít cause significant damage.

The multinucleate species *R. zeae* and *R. oryzae* together with other unidentified Rhizoctonia and Rhizoctonia-like fungi also have been suggested as turf pathogens, but their significance remains undetermined (1, 4, 8, 9). *Rhizoctonia zeae* has been associated with Rhizoctonia blight of tall fescue in North Carolina (9, 11). *Rhizoctonia oryzae* is not recognized as an important turfgrass pathogen in the U.S., but occurrences of *R. oryzae* causing disease have been reported (11, 17). Damage caused by both *R. zeae* and *R. oryzae* has been associated with summer temperatures of 28 to 32C.

In the summers of 1994 and 1995, I isolated R. zeae from leaves taken from bronze patches from two different locations. Although *R. zeae* was isolated, the patches were diagnosed as take-all, which is caused by the root infecting fungus *Gaeumannomyces graminis* var. avenae. (Gga). Take-all is usually referred to as a complex, which means that there are sometimes more than one pathogen present. The *R. zeae* that was isolated probably came in after the Gga had weakened the plant by destroying the root system. In a growth chamber study at 32C, the *R. zeae* isolates were not very aggressive on the bentgrass