way...the journalistic quality of the Chicago Tribune makes it such a great...and successful newspaper! Did the Tribune gain its national reputation by shying away from the truth and always glossing everything over in a positive way? I don't think so...

And truthfully, folks, it's just tons of fun to be able to write almost whatever comes to mind and know that it'll find it's way into *The Grass Roots*. That is certainly not the case with all golf publications...as any discerning, attentive reader can attest.

And, it is certainly not the case with many local newspapers...as witnessed by the contents of our Morris Daily Herald...or the Monroe Evening Times...or almost any other small town newspaper. These publications are held back somewhat by their editors who realize all too well that angering the advertising merchants and city 'powers that be' would be all too damaging to their survival.

It's too bad, really, that some people can't tolerate or respect healthy differences of opinion in the form of the printed or spoken word.

Personally, I don't agree with much that Rush Limbaugh, for example, has to say...he's too much of a showman for me. But, I do like listening occasionally because of his ability to really say what he thinks in a controversial way...which is extremely entertaining.

And, I just loved listening to G. Gordon Liddy on Chicago radio...a bit extreme in his ideas, perhaps, but very well reasoned and intelligent... and very experienced in the ways of the FBI, the military, and the government.

I also really enjoy listening to public radio and television for the quality of programming...and radio in Chicago in general.

On the other hand, I and almost everybody I know breezes through the local newspaper in about ten minutes time...because the journalism...if you call it that...is so lame and boring!! The same is true for local, small town radio...decent music, but so boring!! There is nothing really interesting, controversial, or outrageous. Oftentimes, they are nothing more than a censored mouthpiece of the community. They must really believe that the local populace can't understand, or doesn't want to know, what really is happening here in small town Illinois.

It's quite interesting to read the local newspapers' version of events, then read the Joliet newspapers' more biting, truthful version of events here in Grundy County. There is a huge difference between them...with less people these days preferring the sugarcoated version, I think.

Just consider the number of ways people receive news and current events information these days compared to even ten or fifteen years ago. Now we have numerous, numerous options of ways to receive information...that are so much more advanced...with it all literally at our fingertips and in our living rooms. There is no longer any reason to subscribe, listen to, or watch the journalistic fluff that still is out there.

There are still way too many 'cheerleading' type of newspapers, trade and professional journals, and radio stations. We all still probably read or watch some of them, either in our professional or personal lives. Usually, they are nothing more than a venue for advertisers...and as I get older and wiser...I find that I have no time...and certainly no respect...for them.

Freedom of the press, and more importantly, the freedom of the people to speak the truth is truly a great thing...it's just too bad that more people either don't respect that right...or take advantage of it.

SUGARBUSH COUNTRY CLUB

By Monroe S. Miller

This time of year, especially on a day like this one in late February when the temperature reaches 50 degrees F. and the sun is bright in a blue sky, I think about Mac McGregor and his golf course, the Sugarbush CC. I will never forget the trip I made up there in central Wisconsin, at his invitation, a few years ago.

It came about, actually, while Mac and I were shooting the breeze at the Wisconsin reception during the GCSAA conference. The discussion centered on what we were looking at with particular attention on the equipment show floor. I don't remember exactly, but it seems that year I was shopping greensmowers pretty hard since we needed a bunch of new ones. "How about you, Mac? What do you have your eyes on?" I asked.

They don't have the piece of equipment I need most on display here," he said with all seriousness.

I sort of laughed. Any equipment with even a remote connection to golf turf can be found at the show, and there seems always to be too many exhibitors with machinery or equipment that has no connection at all that we can see to golf course maintenance. They clutter the exhibition hall.

"You've got to be kidding," I said. "If it isn't here, it isn't manufactured or else it is something you don't really need. What is it you are looking for, Mac?"

"A new snowmobile. The one I have now is old, worn and underpowered."

"What makes you think you would find a winter recreational vehicle at a golf course equipment show deep in the south?"

"Because I use it on my golf course," came Mac's rather tart reply.

I didn't want to either insult him or expose my ignorance (which was more likely), so I carefully asked him if he meant he used a snowmobile to groom cross country skiing trails on the golf course.

"That, and to tow the stainless steel tank on a sled frame I use to haul maple sap from our golf course sugarbush back to our sugar house," Mac said. "But I didn't really expect to see snowmobiles here," he admitted with a smile.

Like most people, I know a little bit about maple syrup making and how it is a big business in New England, New York and Canada. I also know there were some maple syrup and maple sugar manufacturers in Wisconsin; I didn't know that Mac was one of them. I told him that.

"You should get out of your office in Madison next month and come up to God's Country to see my maple syrup operation," he offered.

"Is that an invitation?" I asked, hoping that it was.

"Yep," came the reply. "I will give you a call in a month or so, or maybe even sooner, when the sap starts to flow and you can come up and watch what we do. It is a little more relaxed that getting the golf course ready for play each day in the summer, but it is hard work and the days can get to be rather long.

Sure enough, he did call. I took a vacation day, left home early and drove up to the Sugarbush CC. It was a pleasant day in Wisconsin; the sun was made brighter by the two feet of snow that covered most of the state. It was one of those days we ache for in the cold, cloudy, dark weather most typical from Thanksgiving until now. The temperature that day was predicted to rise from the low 20s to the mid-40s — "perfect maple sap weather" Mac said as I got out of my pickup in the clubhouse parking lot. "The sap is filling the pails almost as fast as I can empty them into my collector tank."

(Continued on page 44)

(Continued from page 43)

The sap in maple trees flows not by the calendar but by the weather — great runs can happen from mid-February to late April or even early May. "It's a little like when you open a golf course," Mac added. "You open when the weather says you can."

Good sap running days are like that one — cold at night and much warmer (up to about 50 degrees F) during the day. These wild swings in temperature get the sap moving. "Most often," Mac explained as we walked over to the old snowmobile he wanted to replace at the national, "the best and strongest flows are short, lasting only for a few hours to a day in length. You could have only one good run a year or you might have a dozen good ones. And in some years you do not get even one, instead having to collect sap from piddling little drizzles."

We roared through the snow onto the perimeter of the golf course. It was easy to see why it was named Sugarbush Country Club — maples were everywhere. Big, old sugar maples defined the holes of play, the boundaries of the golf course and they filled the wooded rough areas. Others rose like giant dark gray sentries next to greens and tees. They were majestic. I could only guess at how beautiful this place must be in the autumn color days.

"I'm kind of an old fashioned, amateur maple syrup maker," Mac said to me as we slowed to a stop near a group of sugars that all had one or two 16-quart pails hanging from each, at about 30 inches from the base. As soon as Mac turned off the snowmobile, you could hear a steady drip, drip, drip, of sap into the pails. "I still use the pails to collect sap from the trees. I travel a route around the course, pour the sap into the tank I pull with this old snowmobile and haul it to a storage tank next to the sugar house when it's almost full.

"Serious syrup makers run Tyron or plastic tubing from tree to tree. They are connected to larger plastic pipe that eventually runs down to the storage tank at the sugar house. It eliminates the hundreds and hundreds of pails they otherwise would have to have. But I only tap about a hundred trees and can get by with 150 or so pails; it all works fine for me.

"In fact, I bought most of these pails from a farmer a couple of miles west of here who plumbed his sugarbush and didn't need the pails any longer," Mac said.

It appeared to me that the pails were either stainless steel or galvanized metal; none were plastic. All did have lids on them "to keep out rain and snow, twigs and bark, and even small wildlife," according to Mac.

"When do you dump these pails, Mac?" I asked.

"When they are full," he responded with a look of 'how dumb are you?' Then he laughed. "What you want to know is how far and how fast do they fill up. The answer varies all over the place. Some trees drip sap, some run small trickles into the pail, and heavy producers actually push a small sap stream out the spile.

"Over time a syrup maker gets to know his trees in a way like a farmer gets to know his herd of dairy cows. I've had a sugar maple tree — in fact, that one up there to the right of the 17th green — that once produced 30 quarts of sap in one 24 hour period from one taphole. The average yield of the sugar maples here on the golf course that I tap averages a little better than 10 gallons per tree."

But big maples in New England have been recorded producing 250 to 300 gallons in a season and not suffering from it even a bit. A farmer from Vermont once had a single taphole in a maple in his sugarbush push out 80 gallons of sap!

Mac carefully removed a pail from a tree, opened the lid to his sap tank on runners, tipped open the hinged lid to the sap bucket, and poured the nearly 16 quarts of sap into the tank. He hung the pail back up and continued to capture the sweet harvest.

I stuck my finger under the spile to catch a few drops of the sap. It was cold but only slightly sweet in flavor. I expected a more distinct taste. "Well," Mac said, "that is why the sap goes to the sugar house — it needs to be concentrated. The water gets boiled off in the next step."

We carefully drove up the rough from tree to tree, pouring the say into the collector tank. His old snowmobile was grunting with its heavy load and extra passenger.

Trees on the clubhouse lawn were tapped, as were those lining the road to the clubhouse from the county highway. It was an old-fashioned scene. "You should have a team of horses and a bobsled for this job, Mac," I offered.

"I wish I did," came the reply.

I wondered what he did if there was no snow. "I set the tank on a trailer and hitch the trailer to one of our 8N Ford tractors and hope there isn't much mud. Sometimes I walk substantial distances when wet soil keeps the tractor from some places on the course.

The collector tank wasn't quite full, but Mac headed to the sugar house. It could be seen from a distance — the vents in the center of the peak of the roof were letting out a lot of steam. Wood smoke was coming out of the chimney from the fire in the evaporator. He tiptoed the snowmobile along a fairway, crossed in front of a tee and ran tangential to a slope inching ever closer to the strong uphill side of the sugar house and the storage tank. Gravity was used to empty the collector tank into the storage tank, and it also moved sap from the storage tank into the evaporator inside the sugar house.

Mac ran the first five gallons of sap into a pail "to have handy in case the storage tank ran out of sap while the

fire was too strong." He set the pail inside, next to the evaporator.

"Sometimes, if it gets cold while we are still boiling down the sap, the sap will freeze in the plastic pipe running from the storage tank into the sugar house. We need those five gallons of sap to keep things going while we open the line," he explained.

We unloaded the collector tank, went inside the sugar house where on of his guys on the golf course crew was tending the fire and watching the sap boil down. Mac opened the draft on the evaporator, filled the firebox with slab wood and wood from storm damage on the golf course. In no time the fire was roaring and the sap in the flat but slightly tipped pans was up to a rolling boil.

I had a thousand questions as we stood in the moist, humid air that filled the sugar house. It was very fragrant and sweet smelling.

"How much wood do you use?" I asked as I looked outside at the substantial pile of sawmill slab wood and limb wood.

"Depends on how much syrup we get," Mac replied. "It takes four or five cords of wood for 100 gallons of syrup."

"Do all sugar maples have the same amount of sugar in the sap?" I wondered. "Nope," came the reply. "Most have sap that runs about 3% sugar, but some have given up say analyzed to have more than 10% sugar. And it varies with maples side by side, indicating that sugar content probably results more from genetics than soil or climate conditions."

One thing I had noticed as we were moving around the golf course was that the pails were not always on the same place on a tree. Same approximate height — yes. But some pails were on the south (sunny) side of a tree. Others were on the lower side of a tree on a slope, regardless of the orientation. Others were drilled where most of the branches were or where the bark appeared thickest. "Does it matter, Mac?" I asked.

"I don't know. Maple syrup makers discuss this all the time, but nothing has been quantified. I have often thought about writing the University of Vermont Extension Service to see if there has been any research done on these matters. I simply go on my instinct."

The sap boils at about 220 degrees F. As it boils, the inclination allows gravity to move the syrup slowly from one pan to another. As it moves down, it gets darker, going from clear sap to amber to brown. At the end it is drawn off as syrup.

We visited for a couple more hours. They were always busy, feeding the fire, watching the boiling sap to insure nothing was burned, skimming and tending to any number of other details involved in getting the sap to syrup. One of the guys took the snowmobile and headed out to the golf course sugarbush to continue collection sap from the trees.

Mac did an "apron" test on syrup in the last pan. He poured the warm syrup from a ladle. If it formed an apron along the edge of the ladle instead of dripping back into the pan, it was ready to draw off into the cans.

He also used a hydrometer to check the density. Maple syrup is graded according to color — Fancy, A, B and C. Mac had a series of vials to compare with to grade it properly.

Most maple syrup containers, whether tin cans with a small cap on the top or a plastic jug with a narrow throat, have a quaint scene on them reminiscent of years gone by. You know, that Currier and Ives-like scene of a team of horses pulling a sled loaded with milk cans full of sap through the sugarbush. Usually you can see the old and weathered sugar house in the background. Not Mac.

The cans he used had a golf course scene — flagstick in a golf green, big maples everywhere. Stamped near the top on each side was Wisconsin Maple Syrup from SUGARBUSH COUNTRY CLUB. He had 1/2 pint, pint, quart, half gallon and gallon cans. As they drew the maple syrup from the evaporator, it was filtered through an inner filter of paper and an outer filter of felt. They canned it hot, which insured against fermentation. Also, as it cooled down it created a vacuum which in turn allowed for expansion during the warmer months.

I spent some more time with him on the course, collecting sap from his sugar maples and hauling it back to the sugar house. When the sap was running, they had little choice but to boil until the weather shut the run down.

Late winter in Wisconsin won't be the same for me ever again. Usually by now I am thinking about the spring business meeting, of the first days outdoors on the golf course since late the previous fall, and of opening day.

Now when the bright days of February and March come, I think of maple syrup, the sweet and fragrant steam in the sugar house, and the delicious maple syrup I use on ice cream and French toast and cereal and pancakes.

Mac gave me a quart of Grade A Dark Amber boiled down and canned while I was there. It was a good investment for him — I order a gallon or two from him every year. He brings it with him to the meeting in Fond du Lac.

But none has ever been quite as good or quite as sweet as that first quart from the Sugarbush Country Club. Treat yourself to some, someday.

Organic Amendment and Construction Method Effects on the Moisture Relations of Simulated Putting Greens

By David C. Rappold

The primary purpose of this study was to enhance understanding of the extent to which root zone mix composition and the absence of the intermediate ("choker") sand layer modify water retention, the percolation rate, and capillary rise of simulated putting greens. A secondary purpose was to determine to what extent bentgrass establishment influences putting green percolation rates.

METHODS

The simulated putting greens were constructed in 6-inch diameter, 15-inch high sec-tions of PVC pipe in the manner recommended by the USGA. Physical characteristics of the root zone mixes used, their organic matter contents based on weight loss upon ignition, and bulk densities in the greens are shown in Table 1. The pea gravel used consisted of predominantly rounded particles and was of sufficient fineness to permit elimination of the coarse intermediate sand layer. Sand suitable for the intermediate layer was obtained by screening out the finer material from mason's sand.

After packing, each green was wet until water flowed out of the bottoms of the cylinders. The greens were then allowed to drain for 24 hours, after which moisture content was measured with a time domain reflectometer (TDR) at depths of 2, 4, 6, 8, and 10 inches. Percolation rates were then measured with a falling head permeameter. The greens were then seeded to creeping bentgrass and the green surfaces kept moist until grass emergence was complete. After a growth period of 7 days, sufficient water was added to obtain drainage. Twenty-four hours later, TDR readings were taken and percolation rates measured. Capillary rise was measured in the laboratory with columns of root zone mix packed to the same bulk densities as in the greenhouse and then allowed to dry before water was introduced at the bottoms of the columns to saturate the pea gravel or pea gravel plus intermediate sand layer.

OBSERVATIONS

Effects of Root Zone Mix Organic Matter

The Greensmix 80/20 and Wolosek 80/20 have very similar particle size distributions, but differed substantially (1.2 vs. 3.3%) in organic matter content (Table 1). This may account for the observation that, when averaged over all depths (Table 2), the Wolosek 80/20 retained 36% more water than did the Greensmix 80/20. When the Greensmix 80/20 was amended with Canadian sphagnum peat to provide 3.1% organic matter (Table 1), average root zone moisture was increased only 7.7%.

The difference in moisture retention between the Greensmix 80/20 and Wolosek 80/20 was not, therefore, solely due to a difference in organic matter content. It is thought that type of organic matter also played a role. The peat in the Greensmix 80/20 is highly fibrous and brown in color, while that in the Wolosek 80/20 has very little fiber and is black in color.

The higher organic matter content of the Wolosek 80/20 likely accounts for the lower bulk density of this mix as compared to the Greensmix 80/20 (Table 1). While this signifies greater total porosity in Wolosek 80/20, the lower percolation rate and greater capillary rise of this mix (Table 2) suggests that the increase in porosity was mainly due to greater numbers of capillary pores.

Effects of the Intermediate Sand Layer

Although not confirmed by surveys, the perception is that most USGA-type putting greens are being constructed without the intermediate sand layer. In the present study, leaving out this layer has variable effects on the moisture relations of putting greens.

Table 1. Particle size distribution, organic matter content, and bulk density of the root zone mixes used.

Root zone mix	Fine gravel	Very coarse sand	Coarse sand	Medium coarse sand	Fine sand	Very fine sand	Silt +clay	Organic matter	Bulk density
	% by weight								g cm^{-3}
Greensmix 80/20	3.5	4.5	20.5	57.5	13.5	0.3	0.2	1.2	1.66
Greensmix 70/30	3.5	4.7	21.2	56.9	13.2	0.3	0.2	3.3	1.50
Wolosek 80/20	2.0	5.0	30.5	54.0	8.0	0.3	0.2	3.1	1.53

Table 2. Moisture relationships of simulated putting greens varying in construction materials and methods.

Root zone mix	Choker layer?	Water retention (inches) 2	4	6	8	10	Percolation rate: Before seeding	After establishment	Capillary rise
		% volume					inches/hour		inches
Greensmix 80/20	Y	4.9	6.8	19.6	20.4	22.6	12.8	11.6	1.5
	N	4.6	6.8	23.4	29.4	30.9	14.4	14.5	1.9
Wolosek 80/20	Y	8.1	18.1	27.2	30.6	30.8	7.5	3.0	2.4
	N	5.6	17.4	28.7	31.6	32.3	10.8	3.4	3.2
Greensmix 70/30	Y	8.1	11.5	17.3	24.9	29.8	7.1	7.4	2.3

In the case of the Greensmix 80/20, leaving out the intermediate sand layer increased the average moisture content in the green from 14.9 to 19.0% (Table 2). However, leaving out the layer in the Wolosek greens had no influence on the average amount of water retained.

Percolation rates of the Greensmix and Wolosek greens were increased by leaving out the intermediate sand layer (Table 2). The increases in percolation rates ranged from 12.5 to 30.0%. This observation may relate to unconfirmed reports that greens drain more rapidly when constructed without the intermediate sand layer.

Absence of the intermediate sand layer also increased capillary rise of water in the two root zone mixes (Table 2). At first glance, the differences do not seem to be very great, but do represent 27 to 33% increases in height in the greens to which water will rise from a saturated pea gravel and/or intermediate sand layer.

Bentgrass Root Effects on Putting Green Percolation

A common perception is that laboratory measurements of root zone mix percolation rates do not accurately predict field percolation rates. One reason given for this is that grass rooting is predominantly in the larger, non-capillary pores, which significantly alters putting green percolation rates.

As shown in Table 2, bentgrass establishment did alter percolation rates, but the effect was root zone mix dependent. Bentgrass grow-in reduced the percolation rate of the Greensmix 80/20 greens by only about 8%. In contrast, percolation of the Wolosek greens was reduced 60 to 68%.

CONCLUSIONS

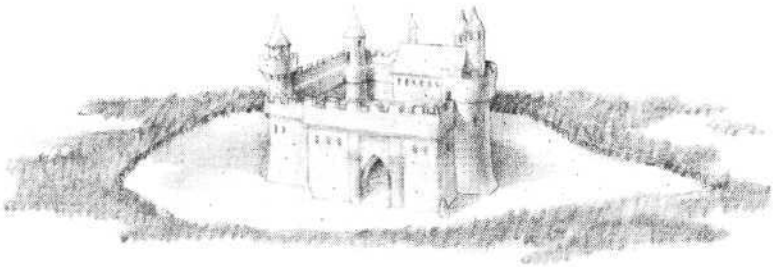
The amount and type of organic amendment used in putting green root zone mixes can markedly affect their moisture relations. Increasing the organic matter content from 1.2 to 3.3% may increase the amount of water retained by 30% or more, reduce percolation rates by 50% or more, and increase the height of water capillary rise by approximately 65%. The magnitudes of these effects are influenced by the type of organic amendment as well as amount.

Leaving out the intermediate sand layer in USGA putting greens can increase water retention by 25% or more, increase percolation rates by 12 to 30%, and increase water capillary rise by 27 to 33%. The actual amount of change is influenced by the type and amount of organic amendment in the root zone mix.

Turfgrass establishment on putting greens has been reported to decrease percolation rates by 40 to 50%. In this study, where bentgrass growth was limited to 7 days after emer-gence, declines in percolation rates ranged from 8 to 68%, the actual amount depending on the type and amount of organic amendment used in the root zone mix.

David Rappold is a December graduate of the University of Wisconsin Turf and Grounds Management Program. His interest in golf course construction was peaked last summer while working on the Whistling Straits Golf Course. He is now employed in the construction of a golf course in South Carolina.

There Are A Few Things The Sand Pro Can't Do



What the Sand Pro 5000 can do is increase bunker playablility regardless of design or sand type. With the most attachments on the market, and adjustable down-pressure, it lets you really fine-tune your bunkers. Double air filtration and enclosed hydraulic drive keeps the grit out while separate fans for hydraulic and engine cooling prevent overheating.

And the 16 H. P. twin cylinder engine offers 3WD and optional on-demand 2WD.

For operator comfort and control Toro included a sound treatment package. And the rear mounted engine makes the operator feel like he's sitting on the machine, not straddling it.

Sand Pro® 5000

It all adds' up to better looking, better playing bunkers. No, the Sand Pro can't build castles, but it sure makes its home in the sand.

TORO®

Helping you put quality into play.™

TURF EQUIPMENT

Reinders

ELM GROVE APPLETON MADISON

13400 WATERTOWN PLANK ROAD, ELM GROVE WI 53122-0825

PHONES: LOCAL (414) 786-3301 800 782-3300

Branch Offices Appleton (414) 788-0200 Madison (608) 223-0200

WHAT'S UP, DOC

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

Introduction

The year of 1997 was an exciting one for me in my new position as turfgrass specialist at the University of Wisconsin-Madison. When I accepted the position in February 1997, I knew I would be entering a world-class academic institution with a well-organized, strongly supportive turfgrass industry. I certainly haven't been disappointed! Every day has brought new opportunities, in fact so many more than I feel I can fully grasp, making me reconsider the whole idea of cloning! I count myself fortunate to have Amy Sausen as an assistant, as she has been invaluable in overseeing the day-to-day management of the research plots and helping with extension activities ranging from answering extension calls to preparing reports.

Opportunities for the turfgrass program (some people call them challenges!) exist on three fronts: extension, teaching, and research. My appointment is 70% extension, 30% teaching, with research expected. To meet expectations on all three fronts, I prioritized in the following way: research→extension→teaching. This may seem a bit backward, but without a solid research foundation, our turfgrass program would have little to "extend". Recognition of an institution's academic and research programs are based largely on research (and subsequent publications), and the University of Wisconsin has long been noted for being one of the top research universities in the U.S. Furthermore, funding from research programs are needed to supply money to fund extension programs, as public funds for cooperative extension have continued to decline over the years.

RESEARCH

A number of research projects were underway when I began in April 1997. During the season, several additional projects were initiated to serve as a partial basis for extension programming. Most plots were developed at the O.J. Noer Center although one study was duplicated on a golf course. Grants were secured for all but two of the new projects, the turfgrass breeding project and the Low Input Sustainable Turf project (LIST). Both unfunded projects required relatively little money (less than $200) to implement. LIST is a multi-state (WI, MN, IA, NE, SD, MO, KS, IN, IL, MI, OH) cooperative effort to identify turf species, not necessarily grasses alone, which can be used to provide adequate turf cover without fertilization, irrigation, or pest management, and with only infrequent mowing. The remaining projects were funded by private companies.

Ongoing Research Projects

The most visible of the research projects I inherited were the National Turfgrass Evaluation Program (NTEP) trials. NTEP and other projects started before my arrival and which continued into 1997 included the following:

1. NTEP-Bentgrass Greens
2. NTEP-Bentgrass Fairway/Tees
3. NTEP-Fine fescues
4. NTEP-Perennial ryegrass
5. Plant growth regulator effects on Kentucky bluegrass turf
6. Evaluation of commercial products for thatch degradation
7. Salt tolerance of selected turfgrasses
8. Remedies for hydraulic leaks on turf
9. Kentucky bluegrass cultivar evaluation for fairways

All the studies were completed in autumn 1997 with the exception of the NTEP-Perennial ryegrass which will be concluded in autumn 1998. Proposals have been submitted to the NTEP to have the bentgrass greens, bentgrass fairways/tees, and fine fescue trials reinstated in autumn 1998 with new varieties.

New Research Projects started in 1997

1. **Supina bluegrass for golf course tee boxes**
   The objective is to determine the suitability of Supina bluegrass for tee boxes.

2. **Competition between annual bluegrass and Supina bluegrass for golf course turfs**
   The objective is to determine the effects of seeding rate, management practices, and traffic on the ability of Supina bluegrass to outcompete annual bluegrass at low mowing heights.

(Continued on page 50)

(Continued from page 49)

3. **Seed mixtures for athletic fields in Wisconsin**
   The objective is to evaluate several mixtures and monostands of turfgrasses for athletic fields in Wisconsin.

4. **Microbial effects on thatch degradation and turfgrass growth via phytohormones**
   Plots were started at both the O.J. Noer Facility and University Ridge Golf Course. The objective is to evaluate the efficacy of a mix of two specific bacteria to control thatch naturally and for their ability to stimulate turfgrass growth through bacterially-produced phytohormones.

5. **Low Input Sustainable Turf**
   The objective is to evaluate 13 mixes/monostands of plant species (primarily fescues and legumes) to provide an acceptable turf stand with minimal maintenance.

6. **Turfgrass breeding**
   This project is spearheaded by Dr. Mike Casler, UW-Agronomy department. In 1997, over 100 unique ecotypes of fine fescue and annual bluegrass were collected from approximately seven golf courses and several cemeteries in Wisconsin.

Additional studies

A Hatch grant was submitted in autumn 1997 to request funding for research on cold stress physiology and management on turfgrasses in Wisconsin. Approximately $100,000 was awarded to fund a graduate student over a four year period. Potential graduate students are currently being sought and interviewed for the position. Funding for the project will become available beginning October 1998.

An interdisciplinary grant "Selection and production of turfgrass germplasm for resistance to snow mold" was submitted to the University of Wisconsin in autumn 1997 to secure funding for snow mold and breeding research. As of January 1998 the reviews were not yet completed.

Research Publications

Three research abstracts, my dissertation, and one U.S. patent were published in 1997. Research abstracts covered topics including statistical analysis of qualitative turfgrass ratings, the effect of mowing height on Supina bluegrass, and the interaction of nitrogen and trinexapac-ethyl on turfgrass photosynthesis in reduced light conditions. My dissertation, "The effects of plant growth regulators on Kentucky bluegrass (Poa pratensis L.) and Supina bluegrass (P. supina Schrad.) in reduced light conditions" was completed in January 1997 and is available through University Microfilms (Ann Arbor, MI). One U.S. patent was issued on April 8, 1997, which described a method to grow turfgrass indoors for athletic fields and golf domes. These publications contribute to recognition of the UW turf program and the Wisconsin turfgrass industry.

Research Presentations

The English Perspective: In July, I was invited to give a research presentation to golf course superintendents at the Bioseed/Probiotics Conference at the Foxhills Country Club in Woking, England (a London