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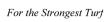


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Presidential Perspective

by Matt Rostal, Superintendent Interlachen Country Club

The 2019 year for Minnesota golf courses was very interesting and for some it

was definitely a year to have in our past. It was a year of very challenging times when the snow melted this past spring. Some golf courses, unfortunately, were left with dead grass from the 2018 Christmas rains, which formed ice and suffocated the turf.

For those golf courses who suffered damage, the 2019 (mine included) will be re-membered as the season of recovery or even regrassing! We started with a cold and wet spring which prolonged the recovery process. It, in turn, didn't let the new turfgrass mature enough to survive the summer months. Personally, my golf course went through two separate recovery periods: spring and fall, which was not very exciting or fun. I truly hope the 2020 year for golf courses and golf course maintenance does not have

the challenges of 2019.

As my year is about to end as President of the MGCSA, I must say how proud I am to have served the membership in 2019. It is a job I have taken very seriously; the time commitment was not too overwhelming and thus should not discourage any member who wants to serve. For me, being President, even with the challenges of recovery from turf loss and having three active children in high school/middle school, never interfered with my other commitments. I look back on this year as being very rewarding, serving the MGCSA and helping guide and advance our profession for our members. I believe we are also making serious progress as environmental stewards in the eyes of all Minnesotans. I thank you for that opportunity, and I hope that I served you well as President.

I must thank Jack MacKenzie, our executive director of the MGCSA. He works tirelessly and his leadership puts our association as leaders nationally amongst all of the regional Superintendent associations. His hard work in advocacy, education and outreach is the backbone of this association. Since beginning my time serving on the board, all the past and current board members have also embraced these three directives which make our association stronger day after day.

We are making great strides concerning our water rights through advocacy at the state capital because of Jack's hard work and tenacity. This next year will be very important for us to show great support at the Day on the Hill (DOH) on March 3rd. It is an opportunity for our membership to turn out in large numbers to express our concern over water rights, but more importantly, to spread the good word about how golf courses are leaders in environmental issues that impact all of Minnesota.

We continue to have strong relationships with our allied associations: the MGA, CMAA, Golf Course Owners and Minnesota section of the PGA. These relationships must

stay strong and grow through educating the challenges that face our facilities. Once these allied associations know how serious the challenges are and how they affect their own associations (golf events, clubs and revenues) it will be the path to have a unified voice at our state agencies. I see this as a top priority for future board(s) to accomplish, to have all allied associations working together to guarantee that we keep the resources and tools to meet the high expectations that we currently deliver to our members and clientele!

I will end with this message: by working hand in hand with our allied associations we will be paid dividends that will be heard at the state capital. I know we are in very capable hands with Scott Thayer and Eric Ritter to continue building these relationships with our allied associations. Jack MacKenzie will continue to be the strongest advocate for the association, but I want all members to understand their responsibilities and to be active in promoting and supporting education of these responsibilities.

A Golf Course Innovation: The Solubilizer 1000

By Joe Berggren, Superintendent at The Wilds Golf Club

"Necessity is the mother of invention" is an English-language proverb. It means, roughly, that the primary driving force for most new inventions is a need.

The golfers' expectations for quality conditions on the golf course are at an all time high. In an effort to meet that high expectation, the goal at The Wilds Golf Club is to spoon feed the fine turf with soluble fertilizers. By doing this we can limit our growth, thatch production, and try to give the turf what it needs. This is nothing new. Many turf managers are doing this.

Our process of mixing soluble fertilizer's on greens and tees is quite manageable. It takes us two tanks to spray greens and two to spray tees. The challenge arises when we are trying to spray 35 acres of fairways ahead of play, while trying to mix soluble fertilizers.

We all have our methods: the bucket and stir-stick method, the run to the shop and grab hot water method and the all too common dump in the tank screen method. For us, those tended to not work as well as we wanted. The filters would plug if the bucket was not stirred enough, running to get hot water takes too much time and I've had the screen on the tank fall through into the slurry! Add in aging equipment without the agitation that it used to have and that spray day turns ugly.

Our need became quite obvious. We required a mixing station for soluble fertilizer.

The idea came from a conversation with Superior Turf's Eric Counselman. He had a version of a mixing station during his tenure at Somerby Golf Club. His version included an induction tank with a pump mounted on a pallet with wheels to be easy to put away after use.

We had an induction tank sitting around and my plan was underway. I was going to plumb the induction tank, add agitation and add a pump

to pump into the sprayer. After multiple nights of over-thinking this at 3 am, I started to collect the parts. The following weekend, my plan took a turn for the better. It was The Wilds neighborhood garage sale weekend. While I will keep my personal opinion to myself on this event, it changed my whole invention.

As I drove the golf course and I saw it sitting there, I had a legitimate light bulb go off in my head. What has plumbing, agitation and a pump already installed?

The Solubilizer 1000! In truth, a used, but likely functional washing machine I had spied at the local garage sale.

I approached the home owner and asked how much. They wanted \$50.00. I did not want to spend any money, as I didn't know if it would work. I waited until Monday morning and the homeowner called me. It didn't sell. We went and picked it up for free.





The Solubilizer 1000 was plumbed directly using washing machine hook ups. We added an extra water spigot for helping to mix and for rinsing. We then plumbed the discharge from the washing machine pump up and out for easy loading.

Our overhead loading system consists of two hoses mounted on ¾" galvanized pipe for support. It swings out when in use and swings back to the building for easy storage. There are two hoses mounted to the pipe. There is one hose for clean water and one hose that comes directly from the Solubilizer 1000.

Overall, the Solubilizer 1000 has performed well. The washer is set to the wash cycle, agitates the fertilizer and when set to the spin cycle; it pumps it out into the tank. I am the only one who has plugged it with fertilizer in my impatience to get the next tank out. Go figure.

The Solublilizer 1000 cost under \$400.00 in plumbing parts and we have had very few problems. Some people have had questions on the salt content of the fertilizers and if it will rust the tank or make parts corrode, but if it does, then we move on to the Solubilizer 2000!

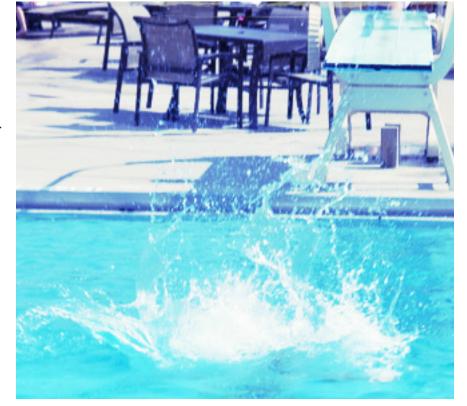




October 19, 1987 the stock market crashed. The Dow plunged 22.6%, which was and is the biggest one day drop in history. It was even bigger than the 1929 crash that started just before the great depression. Black Monday is now etched in history and prompted the market installation of such things known as "circuit breakers" designed to stop trading when markets are dropping rapidly. Issues continued through 1989 with the mini crash on October 13th, 1989, now known as Black Friday. This was not the best news for a finance major at St Cloud State University during this time.

I graduated from St. Cloud State University in 1989 with a degree in finance. Like many of us, after college, the job search began and proved to not be very successful so, I decided to head back to where I had spent the previous summers working as a life guard at Interlachen Country Club. I had been a competitive swimmer as the captain of the St. Cloud State swimming team, so heading back to work as a lifeguard was a simple fix for the summer of 1989 while continuing to look for a job in the finance industry. The summer of 1989 proved to be difficult after going through the ringer of applying for finance jobs in a tough market and not wanting

to accept a position selling insurance. The pool was about to close for the season and I still needed a job. The turf maintenance building was a short walk from the pool, and I knew a few of the guys. I had bumped into the new superintendent, John Katterheinrich, that had started that same year. This short walk turned in to a nice fall position with the turf department



at Interlachen in the fall of 1989. The page turned to 1990, still finding few opportunities in finance, I decided to head back to the pool for the summer, transitioning to the turf department in the fall of 1990. The summer of 1991 saw me leave the pool completely and spend the whole year with the turf department. This resulted in me enrolling at the University of Minnesota in the fall of 1991 to pursue my degree in turf.

Through school I continued to work at the club in the summers and became an official intern in 1993, which was the year Interlachen

hosted the Walker Cup led by Minnesotan's John Harris and Tim Herron and also saw the likes of Justin Leonard and Padraig Harrington. I graduated and was hired as the spray tech at Interlachen in 1994, working this position for a few years while also applying for assistant jobs that were out there. Eric Peterson was the assistant at Interlachen and accepted the superintendent position at Dellwood Hills in 1997. This finance major, me, was lucky enough to then be promoted to assistant superintendent at Interlachen. This was great, Interlachen was great, and I was having fun in this role as assistant for a few years.



I then started to apply for superintendent positions, but nothing was happening, which was okay as I was happy at Interlachen. John was a fun superintendent to work for and

I was surrounded by a great group of guys every year. The fun atmosphere that was created at Interlachen during my early years had a huge impact on my life and my career path. In the winter of 2001, there was a group of superintendents and assistants from

1909

Minnesota that went to the BIG-GA (British and International Golf Greenkeepers Association) conference together in London. When we were there, John and I went out to dinner one night and he said that when we got back he would be putting in his resignation. I was shocked.

During the summer of 2001 I had

the title as interim superintendent, which was eventually removed in 2002 and I have been superintendent ever since. Those first eight years were very unique with the

fact that I was able to live in a house on the course just off the first fairway. My wife and I moved into that house with no kids and we left eight years later with three. I had a spot for my cart in the garage, the kids and I would

go for a drive on the course almost every night and it was easy to check on things if needed. I have a lot of enjoyable memories of living on the course. The one downside was I could never get away. I would get these silly little calls to check on things that I really didn't need to be doing. I'd be in the backyard on a Sunday night and someone always seemed to speed over, not to say hi



but to comment on something. It was just tough to get away. For me now, if I'm doing my job correctly, I should not have to go back in the evenings.

As superintendent at Interlachen, I've had the opportunity to host several large tournaments with the Solheim Cup in 2002 and the U.S. Women's Open in 2008. Between the two, the Solheim Cup was such a fun event because it was on a much smaller scale. We had all the TV towers, but we did not have many of the grandstands or tents. It was so much fun because I got invited to all the player gatherings and was able to mingle with, and get to know, all the players. One night, I got to sit down with Laura Davies and have a few beers. "Hey Laura, do you want another beer?" Which she replied yes to. "Here I'll get you a glass." She then replied, "I like it in a can." I asked the U.S. captain, Patty Sheehan, how she would like the greens. "Well, we like them faster than the Europeans, can

you make them faster?" I then felt like I was able to help them win just a little bit. These interactions are what made this event so much fun.

The 2008 Women's U.S. Open was a much different story than the Solheim Cup. There was much more infrastructure with the build starting two months before the event. There were so many logistical things that needed to happen, mostly due to the small footprint of Interlachen. The craziest part of the U.S. Open was how nice the buildup crew was. They were stopping to let people hit putts and being quiet for members that were hitting tee shots. However, on the way out, it was a fire drill and all out chaos. This crew had a six week deadline and they wanted to be out of there in four weeks to be able to spend more time at home. It was crazy. They were not stopping for anyone. They would drive in front of tees and across fairways, they were letting loose and it didn't matter. But these tournaments were very invigorating for me and I loved them. I'm ready



Left to right, the Rostals; Wendy, Lily, 17, Stella, 15, Charlie , 13, and Matt, taking a break for family time



for another one.

The career path can be pretty tough. There is not a lot of turnover and it takes some time to become a superintendent. It generally does not happen very quickly, and it can be easy to get burned-out and make a change in your path before ever becoming a superintendent. I hope that the superintendent side of the golf course industry can become more equitable for assistants by giving them a living wage. That is the big shift that needs to happen, because you can't expect someone to live on \$30,000 or \$35,000/

year. This has to change, or it is really going to hurt the industry and courses in general. If you can't find people to work, then the conditions are just going to have to go down. The same can be said for the seasonal workers. Providing a better wage for them as they are often the backbone of what we try to accomplish every season. With that said, the seasonal staff can be one of the biggest challenges. I've changed my philosophy over the past five years. I used to demand that if you were to come to work at Interlachen during the summer, I wanted you to come work full time. This ended

up being about 25 individuals. This year, I had 45 for the seasonal staff with individuals working 2, 3, 4 days or full-time. This is the way it has had to go for us, as some are just not willing to put in the full time work. One of my favorite seasonal stories was I had a really big, strong football/hockey player kid working for me, but he was lazy. He only lived two blocks away, but he could never get to work on time. I had to ask him to get to work on time and he replied, "What, do you want me to run or something?" That is when a change in philosophy started to happen.

If you are just entering the industry or are a young assistant, my best advice is to stay focused, be proactive and always ask questions. As a young spray tech, I would ask John if I could sit in on vendor meetings and just be a part of that process, absorb as much as I could. I worked for a superintendent who let me do that stuff. I've taken that attitude with me as a superintendent as well. I've always told my interns that this place is an open book and you are going to get more out of this internship if you ask questions.

Everything is at your disposal if you want to learn here. I always told my interns they can look through any file they want. We are not running a fortune 500 company and I'm here to help better them both personally, and professionally.

My time on the MGCSA board of directors, and now as president, has been great. The strides the MGCSA continues to make with advocacy in terms of water use, BMP's, pesticide regulations, and what golf courses provide to the community, beyond golf, has been a real joy to be a part of. The Golf Day on the Hill event continues to grow, and our industry continues to be in the light for the positive things we bring to the community. Every day, more people throughout the state understand what we do as an industry. It has been wonderful to be a part of the MGCSA and would encourage anyone that has even slightly considered it to please reach out to me as one of my last duties is to find more individuals to serve with the MGCSA, so please do.

TAKE PART IN THE

GOLF INDUSTRY DAY ON THE HILL

Starts at 7:30 a.m. Tuesday, March 3, 2020

Meet at: Christ Lutheran Church 105 University Ave. W St. Paul, MN 55103











The golf industry in Minnesota has a track record to be proud of. Besides hosting numerous major golf championships including the PGA Championship, both Men's and Women's Opens, and the Ryder Cup, the business of golf annually generates over 2.3 billion dollars in revenue and employs 35,000 individuals in the state. Do you want to help ensure our industry remains strong and vital in the future? Attend the 2020 Golf Industry Day on the Hill!

Golf Industry Day on the Hill is your chance to **tell your elected officials your story** about the issues you face every day. Recently, the golf industry has been involved in conversations regarding phosphorous fertilizer, a license plate initiative, and limiting unfair taxation. We need YOU to be part of the conversation!

This day will focus on reintroducing our industry, telling the good environmental story of the golf, sharing the 2018 Minnesota Golf Association Economic Impact Study and hopefully introduce a Bill to include the US Department of Agriculture's definition of the production of specialty crops as agriculture based industries. This would change golf's placement in the DNR's Water Use Category from Category Six, Non-Essential to Category Three, Agricultural Irrigation. While on the Hill, the golf industry will also support our allied green industry's initiatives as we have similar concerns and together our combined state economic impact doubles.

What key messages will we deliver to legislators?

- Economic Impact of Golf in Minnesota: The golf industry has a \$2.3 billion annual economic impact to the state's economy and sustains 35,000 jobs.
- Event Economic Impact: The Ryder Cup, the largest sporting event held in Minnesota, was watched by 500 million people worldwide and generated an economic impact of over \$140 million dollars locally.
- Environmental Stewardship: Golf helps to create and steward 21,000 acres of pollinator habitat, wildlife corridors, native plant areas, natural water features and wetlands.

• Green Space: Green space on golf courses increases carbon sequestration, generates oxygen, provides sound abatement and solar/glare reflection as well as dust collection.

• Stormwater Management: Golf courses provide for communities' largest rain gardens, pollution abatement, ground water recharge and erosion control.

To register, fill out page 2 of this form. Please reserve your spot by February 18th for the March 3rd event.

Questions about the topics?Call Jack MacKenzie at 651-324-8873, or e-mail jack@mgcsa.org.

Questions about registration? Call the MNLA office at 651-633-4987.





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Email: lora@mnla.biz | Fax: 651-633-4986 | Mail: MNLA, 1813 Lexington Ave N, Roseville, MN 55113 Questions about the topics? Call Jack MacKenzie at 651-324-8873 or email jack@mgcsa.org.

Questions about registration? MNLA will be coordinating appointments for the golf industry. Call MNLA at 651-633-4987.

Turfgrass Breeding 101: Screening for Stress Tolerance

Dominic Petrella Postdoctoral Associate Departments of Horticultural Science and Agronomy and Plant Genetics

University of Minnesota

One of my roles as a postdoc-

straight forward, but often times it

can get complicated.

First, I'll

toral research associate in the turfgrass science program at the University of Minnesota is helping to improve the tolerance of turfgrasses to various environmental stresses. An approach that

we use to make

Extension
Turfgrass Science

present a general outline of how we can select plants with tolerance to a defined stress, and second, I'll walk through a specific example involving selecting turf-

these improvements is to select for top-performing plants under specific stresses that can then be used to generate new cultivars. It can seem grasses for improved growth under tree shade – a complicated example of selection for stress tolerance.

General steps in screening turfgrasses for stress tolerance

Prior to making any plant selections, the first step towards making improvements is better understanding of the stress that will be imposed. This includes collecting and analyzing data on the environmental condition of choice. Using high temperatures in the summer as an example, there are a number of questions that must be asked: What are the historical average high temperatures during the summer months? What are the projected future increases? How many hours per day does the temperature stay at this maximum? What is the minimum temperature during these periods? How many consecutive days does the temperature stay this high? This is a long list of questions, but each could contribute to how turfgrasses perform during periods of high temperature and warrants incorporation into plant screenings. These questions are also important to understand because we make many of our initial selections for top-performing plants in growth chambers (Figure 1).



Figure 1, left: A growth chamber used for controlled environment plant science research.

Plant growth chambers are fully enclosed structures designed to have precise regulation of temperature, light intensity, and to some extent relative humidity. Using these growth chambers, we can repeat our selections over and over again under the same exact conditions. This allows us to screen thousands of individual plants non-stop over an entire year, something we can't do in the field or even in the greenhouse in Minnesota. Screening plants for stress tolerance can be done in the field, but due to rapidly fluctuating conditions, co-occurring stresses, or a potential lack of the stress occurring, field screening should generally not be the first step. Screening can also take place in a greenhouse, but many times controlling the stress of interest in the greenhouse can be difficult, and environmental conditions in the greenhouse change too much over the course of the year. Growth chambers can many times be a good choice for screening for specific stress responses, and the data collected from the field can be used to program the growth chamber to match the field conditions as best as possible.

We also need to decide what source of turfgrass seeds we will use. To find the best turfgrasses, we need a diverse selection of material collected from across the globe. To do this, we acquire seeds of turfgrass species accessions. An accession is a plant(s) collected from a specific place at a specific time, and the same species can have many accessions. An example would be a clump of Kentucky bluegrass growing at the top of a hill, and a clump at the bottom of the hill. These two clumps are the same species, but because they are in different locations could be considered different accessions because the environments they're growing in will affect the expression of their genetic makeup. For stress tolerance selections, it's best to use very diverse accessions, sometimes originating in locations that have stresses similar to the stress of interest. Using accessions from multiple countries or ones that come from different environments can help us to find top-performing plants.

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Approaches for screening for improved turfgrass growth under tree shade

Selecting top-performing plants for improved growth under tree shade is an example of a more complicated process. This is primarily due to the fact that under tree shade, turfgrasses not only deal with changes in properties related to light, but also may come under competition for water and mineral nutrients with the trees; the micro climate may also be different as well. Here, I will only focus on selecting plants for their ability to grow better under reduced light quantity and quality. Once the top-performing plants for light-related properties are identified, these plants can then be screened for tolerance to the other types of stresses associated with tree shade.

To make improvements for shade, first we need to acquire data from the field to replicate in our controlled environments. Under trees, changes occur in both light quantity and quality, collectively called foliar or qualitative shade (more detailed information can be found at: https://turf.umn. edu/news/making-sense-light-data-light-quality). Light quantity changes

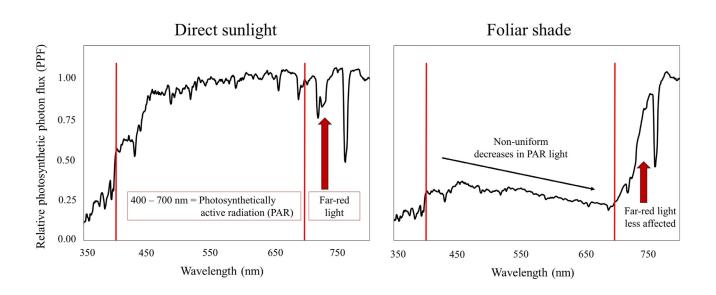


Figure 2: Solar irradiance spectra under direct sunlight (left) and foliar shade (right).

include reductions in photosynthetically active radiation (PAR), light between 400-700 nm that results in photosynthesis, which can decrease overall turfgrass photosynthesis (Figure 2).

Changes in light quality are more complex, and are due to non-uniform decreases in specific wavelengths of PAR (Figure 2). Looking at the foliar shade spectra in Figure 2, we can see that light near 650 nm (red light) is reduced more than light near 450 nm (blue light). Most importantly, under tree shade, turfgrasses are exposed to greater amounts of far-red light (approximately 730 nm) relative to the amount of red light (approximately 660 nm), resulting in a decrease in light quality. A reduced ratio of red to far-red light (R/FR ratio) results in more specific changes in plant growth that may not be induced by uniform decreases in PAR.

Changes in the properties of light due to tree shade are complicated, and can therefore make the screening process more difficult due to having to decrease the amount of PAR, decrease the R/FR ratio, and potentially even try and replicate the non-uniform decreases in PAR. Data we acquired during the summer of 2018 across the University of Minnesota St. Paul campus showed that moderate tree shade areas typically reduced PAR between 40-80%, and R/FR ratios between 0.40-0.60. However, areas with very dense tree shade could reduce PAR by over 95% with R/FR ratios between 0.10-0.15, and the shape of the spectra changes (a reduced ratio of blue to green light) further under dense shade as well — further complicating screening for growth under dense shade (Figure 3).

We are currently using data acquired under moderate tree shade to make selections for plants that perform and grow better under these conditions. Earlier I said that selections for stress tolerance should first be made in growth chambers, but in this instance we're making our initial selections in the greenhouse. We can replicate the changes produced by foliar shade using photoselective filters: pigment impregnated material that absorbs and transmits specific wavelength of light – similar to leaves

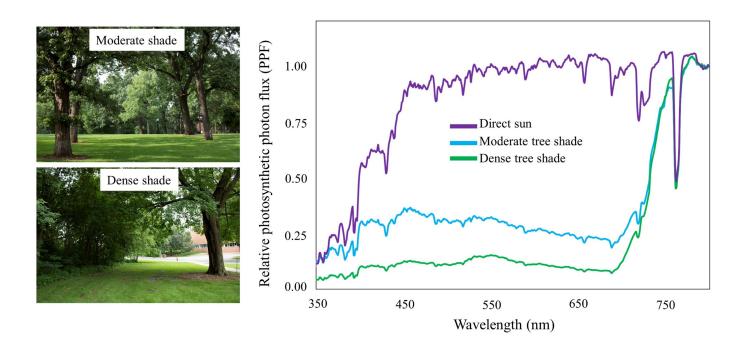


Figure 3: Various levels of tree shade on UMN St. Paul campus (left), and solar irradiance spectra from these moderate and dense tree shade areas (right).

(Figure 4). The greenhouse is a good choice for the first selection here because we get natural sunlight for a large proportion of the day (except on cloudy days and days in the winter months when supplemental lighting is on), unlike growth chambers that use fluorescent lamps or high intensity discharge (HID) lamps which don't reproduce sunlight as well as we'd want. The type of lights present in growth chambers are an example of a downside of growth chambers, but for all of our screenings we have to weigh the pros and cons of our selection methods - no methods are perfect.

The photoselective filter tent that we are currently using is made with two different filters, it reduces PAR by about 70%, and the R/FR ratio under the filter is about 0.40. You can see in Figure 4 that the shape of the spectra under the tent is also very similar to the spectra from moderate foliar shade (Figure 4). Under the tent we seed individual seeds of specific turfgrass accessions into separate pots, and we monitor growth over a two month period. During this time frame, we measure the height







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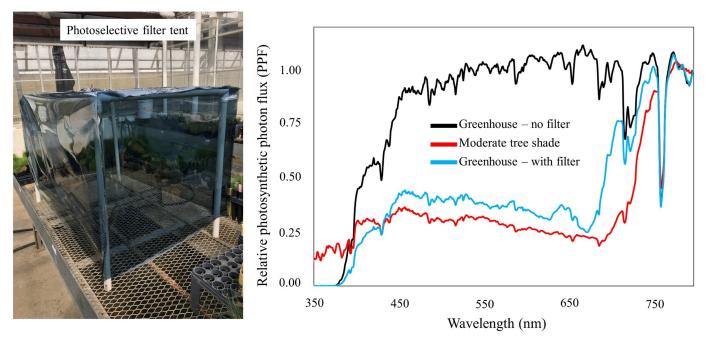


Figure 4: Photoselective filter tent (left) and the spectra within the tent compared to moderate tree shade and light within the greenhouse not under the tent (right).

of the plants, and we count the number of tillers every two weeks. In the end, we evaluate the ratio of plant height to tiller number, and we select plants that have a ratio as close to 1.0 as possible. The plants in Figure 5 are examples of top and bottom-performing plants from our selections. Top-performing plants have a darker green color, shorter stature, and continue to produce tillers, which results in greater turfgrass density. Bottom-performing plants display the opposite of these traits, and are termed shade-avoiding plants. Interestingly, having shade-avoiding traits is a common way for many plants to tolerate foliar shade, but these traits are opposite of what we want out of a quality turfgrass growing in shade.

After making the selection under the photoselective filter tent in the greenhouse, the top-performing plants can be moved forward for crossing and cultivar development, for further selections under deeper shade conditions, for selections for other stresses that may occur under tress shade, or for field-based selections under trees to see how these plants perform outside. Currently, we are using this shade selection process for improving fine fescue (Festuca spp.) growth under foliar shade. The selections that we've made under the photoselective tent are performing

well in a second screening within a growth chamber programmed to mimic deep shade (Figure 5), and we have planted some top-performing hard fescues (F. brevipila) produced under these screening methods in a nursery to evaluate these methods for cultivar development. Our research should result in improved cultivars with greater shade tolerance for use by turf managers.

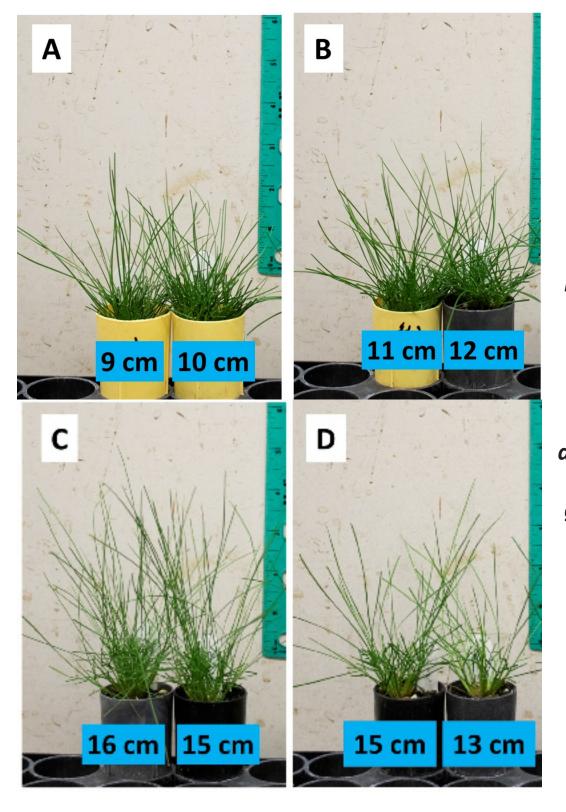


Figure 5: Top

(A&B) and
bottom (C&D)
performing hard
fescue plants
selected under
a photoselective
filter tent in a
greenhouse
after being grown
in a deep shade
growth chamber
for 7 days.

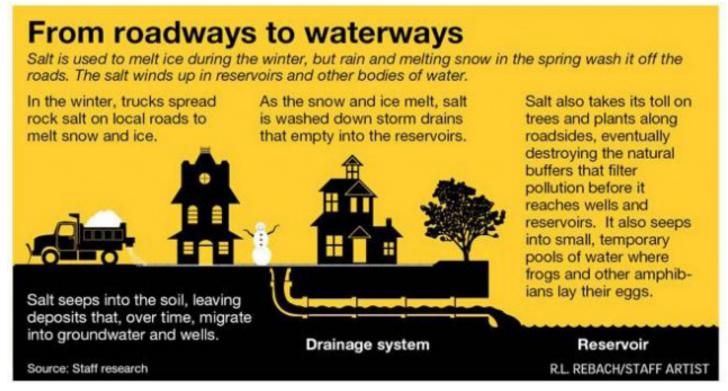
Melting Snow and Ice With Salt: Colligative Properties and Freezing Point Depression

by Anne Marie Helmenstine, Ph.D., Dave King/Getty Images

If you live in an area with a cold and icy winter, you have probably experienced salt on sidewalks and roads. This is because salt is used to melt the ice and snow and keep it from refreezing. Salt is also used to make homemade ice cream. In both cases, the salt works by lowering the melting or freezing point of water. The effect is termed "freezing point depression."

How Freezing Point Depression Works

When you add salt to water, you introduce dissolved foreign particles into the water. The freezing point of water becomes lower as more particles are added until the point where the salt stops dissolving. For a solution of table salt (sodium chloride, NaCl) in water, this temperature is -21 C (-6 F) under controlled lab conditions. In the real world, on a real sidewalk, so-





dium chloride can melt ice only down to about -9 C (15 F).

Colligative Properties

Freezing point depression is a colligative property of water. A colligative property is one which depends on the number of particles in a substance. All liquid solvents with dissolved particles (solutes) demonstrate colligative properties. Other colligative properties include boiling point elevation, vapor pressure lowering, and osmotic pressure.

More Particles Mean More Melting Power

Sodium chloride isn't the only salt used for de-icing, nor is it necessarily the best choice. Sodium chloride dissolves into two types of particles: one sodium ion and one chloride ion per sodium chloride molecule. A compound that yields more ions into a water solution would lower the freezing point of water more than salt. For example, calcium chloride (CaCl2) dissolves into three ions (one of calcium and two of chloride) and lowers the freezing point of water more than sodium chloride.



Salts Used to Melt Ice

Here are some common de-icing compounds, as well as their chemical formulas, temperature range, advantages, and disadvantages:

Name	Formula	Lowest Practical Temp	Pros	Cons
Ammonium sulfate	(NH ₄) ₂ SO ₄	-7 C (20 F)	Fertilizer	Damages concrete
Calcium chloride	CaCl ₂	-29 C (-20 F)	Melts ice faster than sodium chloride	Attracts moisture, surfaces slippery below -18°C (0°F)
Calcium magnesium acetate (CMA)	Calcium carbonate CaCO ₃ , magnesium carbonate MgCO ₃ , and acetic acid CH ₃ COOH	-9 C (15 F)	Safest for concrete & vegetation	Works better to prevent re-icing than as ice remover
Magnesium chloride	MgCl ₂	-15 C (5 F)	Melts ice faster than sodium chloride	Attracts moisture
Potassium acetate	CH₃COOK	-9 C (15 F)	Biodegradable	Corrosive
Potassium chloride	KCL	-7 C (20 F)	Fertilizer	Damages concrete
Sodium chloride (rock salt, halite)		-9 C (15 F)	Keeps sidewalks dry	Corrosive, damages concrete & vegetation
Urea	NH ₂ CONH ₂	-7 C (20 F)	Fertilizer	Agricultural grade is corrosive

Factors That Affect Which Salt to Choose

While some salts are more effective at melting ice than others, that doesn't necessarily make them the best choice for a certain application. Sodium chloride is used for ice cream makers because it's inexpensive, readily available, and non-toxic. Yet, sodium chloride (NaCl) is avoided for salting roads and sidewalks because the sodium can accumulate and upset the electrolyte balance in plants and wildlife, plus it can corrode automobiles. Magnesium chloride melts ice more quickly than sodium chloride, but it attracts moisture, which can lead to slick conditions. Selecting a salt to melt ice depends on its cost, availability, environmental impact, toxicity, and reactivity, in addition to its optimal temperature.

thom nikolai michigan state

interviewed by matt cavanaugh

adjective

insensitive to criticism or insults.

"you have to be thick-skinned to work in the turf industry" synonyms: insensitive, unfeeling, tough, hardened, callous.

According to Gary Chapman there are five love languages. Words of Affirmation, Acts of Service, Quality Time, Receiving Gifts and Physical Touch. For me I accept and give love in two very specific ways. First, Words of Affirmation which in reality means I'm susceptible to flattery. Say thanks to me and I'm

flying high. Second, Acts of Service. I show love for others by doing things for them. If I'm truly honest with myself, I likely do things for other people just to get an "atta boy" from them. A little sick if you think about it too long. On the flip side. Don't even think about giving me a gift for the Act of Service

I just performed and for the love of

God, don't give me a hug. We may



- 11 Words of Affirmation
- 9 Acts of Service
- 7 Quality Time
- 3 Receiving Gifts
- Physical Touch

think we know someones love language and what makes them tick, but the fact remains, we don't know what we don't know and you may need to be thick-skinned to hear it.

The one simple thick-skinned question:

Thom, you visit with and have many conversations with golf course superintendents and assistants. Based on the current facts, research and knowledge, what is one thing you see that we as turfgrass managers could change to help improve turfgrass decisions?

Thom: "I'm going to tweak the question just a little. Instead of saying, help improve turfgrass decisions, how about help improve the professional status?"

thick-skinned: Absolutely, let's hear it.

Thom: "One thing I can't get my head around is volunteering for professional golf tournaments. It seems counterproductive as a way to advance the profession. I understand the comradery part of it, wanting to pitch-in and help out the guy down the road, or a desire to be a part of an event where the most famous golfers in the world are playing. I've worked a big event at The 85th U.S. Open, however I was getting paid and that was okay with me because I was putting in over 100 hours/week and I was a college student. I don't think volunteering elevates the profession to the status I think it could be if people were paid for their craft at professional golf events."

thick-skinned: So I've volunteered as well. If you back up, the profession has done a really good job at showing that we are more than hole diggers and grass growers (the whole suit and

tie thing). Is this maybe the next step in the profession or how has this gotten started?

Thom: "It's that comradery thing. It's the fact that we want to help that guy in our profession and maybe learn some things along the way. What drives me nuts is the purse at these tournaments. Extreme example, at the 2019 FedEx Cup the purse was \$60 million. In 2019, the top eight guys made over a million dollars and last place earned \$70,000. How do you feel knowing that some 20 volunteers from the profession are used to prepare the golf course? Why can't The Tour put aside 1-2% (that comes to \$600,000 -1.2 million at the Fed Ex Cup) from the tournament to pay for a COLLEGE EDUCATED PROFESSIONAL MAINTENACE STAFF to prepare the course? Expecting professionals to volunteer their craft is like rubbing your nose in doodoo, it is downright insulting to me to the point that it actually makes it hard for me to watch a tournament anymore. Let me put this into context. I would not let someone work for me if I couldn't pay them. That is simply un-American. For example, I've been teaching at Michigan State for years and on two occasions I've hired a past student that owned a lawn care company to take care of my lawn. At the end of the year neither of them charged me for their services because I was their exprofessor. I understand it was a sign of respect, but I fired them. This is not how I want this to be for turfgrass professionals. I can't believe that companies large enough to sponsor professional golf tournaments can't put aside 1-2% to pay for excellent playing and aesthetic course conditions for the touring pro's and tv audience. This would elevate the profession and in

my view begin to help with the labor shortage in the industry. Instead the sponsors and the Tour are saying 'Hey, we don't have to pay them, they'll just do it for free!' Where else does this happen? I don't understand it, this is where the profession should be making top dollar."

thick-skinned: Do you know of this happening in other parts of the turfgrass industry with your students?

Thom: "Following the World Series it is customary for the players from the winning team to give a share of the pot to the field manager/staff. I know that on several occasions that share has been over a million dollars. I've had students that have performed their internship with teams that have gone on to win the World Series. The students were back in class during the World Series but many, if not all, have received a check following the series for being part of the winning team. Also, it is my understanding the Super Bowl pays for travel, lodging, and meals along with a salary for the grounds crew to prep and care for the practice facilities and the game field for 2-weeks prior to the big game. It befuddles me that non-paid personal are used to care for professional golf events in 2019. I'd like to see this end and if there is anything I can do to help it end, I will.

thick-skinned: Have you voiced this opinion before?

Thom: "Well, I wrote a little piece for GCM back in May putting it out there for the first time. I've got over 24 pages of comments from people over this little piece. Comments from

people in the U.S., Canada, India, Australia and came from individuals on golf courses, academics, and distributors. Some of the biggest complaints came from distributors feeling they were being taken advantage of. If this were to come to pass there are certainly some obstacles to be considered, especially for anyone that is coming in to help from another country. Perhaps they could have their portion of the salary donated in their name to GCSAA research, the Wee One Foundation, or scholarships for turfgrass students.

thick-skinned: From these comments, what side of the argument do most people fall on?

Thom: "The vast majority of people wrote 'wow, I've never thought of this before and I couldn't agree with you more.' On the other hand there was one guy that sent me the definition of the word volunteer. Which by the way, whoever that was, I love you. Someone also wrote, "If they paid us money we wouldn't do as good of a job". What? I'm a big believer in capitalism and I'm also a believer in status and one of the ways to drive this profession forward is to get paid for these type of events. I get that this is an honored tradition among people in this profession and I really appreciate that. It's likely really deep rooted and it goes very far back probably to the point where it was Old Tom Morris and his buddies volunteering to get the course ready for "The Open". However, they were not only preparing the course but they were the guys playing in "The Open". It has just sort of stayed there except now when you volunteer you don't get to tee it up."

thick-skinned: My personality and my love language is to help people and not get paid for it. Just look at this article, it's 10:09pm on a Thursday and I'm not getting a dime for this. I truly like helping people. However, the angle of moving this profession forward does mean a lot to me. There certainly is a money issue in this profession especially with the assistant role. These assistants are often the ones going to the tournaments and "learning". I don't think it out of line to start pursuing this line of thinking to elevate the status of this profession one more notch.

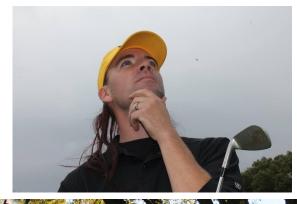
Thom: I have a history of being scoffed at, such as when I told people they were putting down to much potassium, they should mulch tree leaves into their rough, or that they should roll putting greens at least 3x/week. On each occasion I was originally told I was crazy. I value honest opinions even if when people think I am wrong. In this case, I have no research to back me up, just an opinion. Please email me and/or thick-skinned your opinion on this article. nikolait@msu.edu Thank you thick-skinned.

The MGCSA membership wishes to thank Dr.
Thom Nikolia for his contribution to the Hole
Notes magazine and industry support. Open
minds have always opened doors for
opportunity. We appreciate that.



Dr. Thom Nikolai is a Senior Turfgrass
Academic Specialist in the Department of
Plant, Soil and Microbial Sciences at
Michigan State University. When he is not
talking turf he is likely grilling on this new
grill. Thom can be reached at
nikolait@msu.edu

Matt Cavanaugh is an Assistant Superintendent at Rush Creek Golf Club in Maple Grove, MN.







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Register at MGCSA.org







MGCSA Shop Tours Event

February 4, 2020

Oneka Ridge Golf Course, host Chris Michaelson White Bear Yacht Club, host John Steiner CGCS Dellwood Country Club, host Eric Peterson

Shop Tours begin at Oneka Ridge, car drop at Dellwood Country Club Shop for car-pooling to the WBYC then back to Dellwood Country Club.

The parking at WBYC is TIGHT. Very TIGHT. Car-pool PLEASE

This popular MGCSA opportunity combines both education and social networking. Bring your staff, especially your equipment managers, and tour three very different turf management centers. You drive between stops.

Cost of the day is \$35 per participant and includes: coffee, donuts and lunch

Pre-Registration by January 24 please

Oneka Ridge Golf Club Tour from 8:00 - 9:15

Car drop off/car pool at Dellwood CC Shop 9:20 ish

White Bear Yacht Club Tour from 9:30- 10:40

Dellwood Country Club Tour from 10:45 - 12:00

Amazing Lunch at Dellwood CC at 12:00

GCSAA CEU's and Random Participation Prizes to be awarded

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Elm Trees - Dutch Elm Disease Resistant Varieties

Throughout the state, native American elms (*Ulmus americana*), red elms (*U. rubra*) and rock elms (*U. thomasii*) are still falling prey to Dutch Elm Disease (DED). DED is one of the most widely-known tree diseases, affecting elms world-wide. Fortunately, researchers have been working to breed and select DED-resistant trees to replace those stately giants. Now, more than ever, these trees are finding their way into home landscapes due to increased demand and nursery availability.

Since 1999, the University of Minnesota has been evaluating, selecting, and screening elms for use in Minnesota. To date, they have studied thousands of elms from dozens of different varieties. Unless stated differently, all trees listed below should be hardy in USDA Hardiness Zone 4.



HYBRID ASIAN ELMS

These elms are the result of controlled breeding programs throughout North America. All have demonstrated tolerance to Dutch elm disease and are great selections for tough sites where other trees won't grow. In general, hybrid elms are smaller at maturity than their American cousins. Many also have leaves and mature forms that are distinctly different than American elm.

- Accolade™ Smaller at maturity but similar to the typical American elm form with strong insect resistance, such as elm leaf beetle. Widely available at most nurseries and garden centers.
- Cathedral Vase-like shape, good resistance to elm leaf beetle and other leaf cutting insects. Leaf
 hoppers and similar pests however can be a problem and may require control practices. Limited
 availability.
- **Discovery** Very slow-growing, requires crown thinning to avoid cross branches, **winter hardy to USDA Zone 3**, stress and drought tolerant. Limited availability.
- **Triumph™** More upright in form than Accolade, but slightly less insect resistance. Limited availability.
- **Commendation™** Hybrid of Accolade, Siberian elm, and the European field elm (*U. minor*). Excellent form when young, interesting bark texture and lower maintenance than Accolade or Cathedral. Limited availability.
- **Danada Charm™** Upright hybrid fast grower. Lower maintenance than some other selections. Beautiful red-tinged new growth! Limited availability.

AMERICAN ELMS

Over the last 100 years there have been dozens of American selections, unfortunately, most did not survive the ravages of DED and have been lost and forgotten. These selections have shown excellent tolerance to DED and continue to be great selections for providing the "high-canopy shade" that American elms are known for.

- **Princeton** Selected in 1922, vigorous growth rate, upright form, available in some garden centers and also through mail-order.
- Prairie Expedition A recent (2004) North Dakota State University selection. Classic vase-shaped
 American elm form and growth rate, outstanding autumn gold color, winter hardy to USDA zone 3.
- **New Harmony** Another USDA selection of American elm *(U. americana)*. Appears to have superior form when compared to Princeton and Valley Forge. Limited availability.
- Valley Forge USDA selection, outstanding DED resistance, requires heavy pruning, limited availability through mail-order

WHERE TO PURCHASE ELMS

Elms are gaining popularity and many nurseries grow these varieties. Check with your local garden center and ask if they can special order your favorite elm if not currently in-stock. Also, many American elms are available online at www.botanyshop.com.

Elms for the Twin Cities: A Guide for Selection and Maintenance (rev. 02/23/2011)							
	DED Resistance ¹	Growth Rate	Hardiness	Insect Resistance	Form	Maintenance Requirements	Storm Breakage
Accolade™	very good	fast	excellent	excellent	vase	moderate	excellent
Danada Charm™	very good	v. fast	good	good	vase	moderate	fair
Commendation™	very good	v. fast	excellent	good	oval/vase	moderate	good
Camperdown	unknown	slow	poor	good	weeping	moderate	excellent
Cathedral	good	v. fast	excellent	good	vase	high	fair
Discovery	good	slow	excellent	good	upright	moderate	excellent
Frontier	good	slow	poor	fair	upright	low	excellent
Homestead	good	v. fast	good	fair	upright	moderate	good
New Horizon	excellent	v. fast	excellent	fair	upright	high	good
Patriot	excellent	fast	excellent	excellent	vase	low	excellent
Pioneer	good	moderate	fair	fair	globe	low	excellent
Prairie Expedition	very good	fast	excellent	good	vase	moderate	good
Princeton	good	fast	good	fair	vase	high	fair
Prospector	excellent	moderate	fair	good	vase	high	fair
Triumph™	very good	v. fast	excellent	good	vase	moderate	moderate
Valley Forge	excellent	v. fast	good	fair	vase	high	fair
Vanguard™	very good	fast	excellent	fair	vase	high	fair

¹ Dutch Elm Disease resistance and some of the insect resistance recommendations are based on data and observations at the University of Minnesota combined with previously published work. Please refer to the *Elms for the Twin Cities: A Guide for Selection and Maintenance* for a complete list of citations.

ELM MAINTENANCE

Many of these elms require considerably **more pruning and training** than other landscape trees and the first ten years often determine how they will perform for the remainder of their lives. In the case of elms, a small investment in maintenance during the "formative years" will have a huge payoff when they are approaching maturity. Like most trees, these elms are best maintained with a strong central leader; this ensures a straight stem and keeps the tree growing up rather than out! As the lower side branches grow and increase in diameter, they should be removed until the desired clearance for the site is reached. Knowing when and how much to prune and maintain trees requires experience so if you're not sure how to work on young elms, contact an experienced International Society of Arboriculture (ISA) Certified Arborist to get you started right. The investment made now will pay off when your tree is growing beautifully, is structurally strong and is providing shade on your property.

Diversifying our landscapes with many different varieties of trees helps to create a sustainable ecosystem. All of the elm varieties mentioned above offer excellent potential for use in rural windbreaks. These DED-resistant elms add to our array of tree species that can be planted in the upper Midwest, contributing to greener and cooler communities throughout Minnesota!

To learn more about DED-resistant elm trees review these web sites:

DED history: <u>z.umn.edu/dedhistory</u>

• DED symptoms: <u>z.umn.edu/dedext</u>

Pruning Young Elms Book: trees.umn.edu/products

• Elms for the Twin Cities: z.umn.edu/elmstc

Record your Elm tree: <u>elms.umn.edu</u>

University of Minnesota Urban Forestry: trees.umn.edu

Source: Jeff Gillman, formerly of UM Horticulture, St. Paul; Chad Giblin, UM Forest Resources, St. Paul; Gary Johnson/Eli Sagor, UM Forestry Extension, St. Paul; Mike Reichenbach, UM Extension, Cloquet; Gary Wyatt, UM Extension, Mankato



University of Minnesota | extension

Bound

by Jack MacKenzie, CGCS

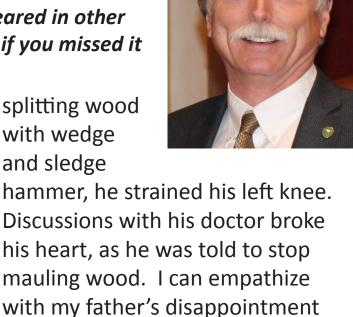
Reprinted with permission from the October 2007 Hole Notes magazine. This column has appeared in other publications and is worth another look if you missed it the first time. Enjoy.

Last week over a cup of English Breakfast Tea, my father, 79 years young, and I discussed life, growing old and the gradual decline of our physical attributes. We do enjoy each other's company and I am fortunate to visit with a close friend of his sage wisdom.

This particular meet and greet was prompted by the removal of a large, cancerous growth on his scalp. Indeed the scar was ugly, but he took the surgery in stride and proclaimed a secondary success, as the closure required some skin stretching to eliminate the excavation. In turn, this removed several wrinkles from his face. Every cloud has a silver lining I guess!

Some other news shared that day was not so bright. Recently, while splitting wood with wedge and sledge

wood hoarders.



Growing up on a five-plus acre wooded lot exposed me to my father's malady from an early age. It was not uncommon for him to announce on a Friday evening that, "Tomorrow we are going to split some wood!". Of course this meant that he was going to use the chain saw to down a tree and trim branches while my siblings and I

for I, too, share with him and suffer

from a common, though rarely dis-

cussed, compulsion. We are both

hauled the brush to the burn pile. Then the Big Guy would chunk the trunk into 20-inch pieces and the labor reserves carried the sections to the splitting area.

Stacked between two live trees, the logs would be allowed to dry a bit, perhaps even into the winter when a cold snap froze the wood and facilitated splitting. Easier for my father to split that is, because the hauling and stacking of split wood were children's chores. He was exempt because he was the Wood God of Pine Tree Lake Road. We had two fireplaces in our house and it seemed our "chore" was never completed!

My father had a "thing" about wood, wood potential, wood accumulation and wood piles. On drives through the neighborhood he would comment on declining trees and the opportunities to add to his accumulation of timber. Vacant lots were uncharted territories where we could watch while he dropped the dead tree. And sweat as we,

the child labor force, loaded the back of the "woody" station wagon with prime oak, ash or maple.

Not only did he have the eagle eye for trees, but my Dad ruled when it came to dumpster diving for kindling wood. Every home under construction held vast quantities of scrap to be surveyed, sorted, stacked, hauled and restacked at home to be used to ignite the hoarded and worshipped firewood. Sometimes these pieces were large enough to do home projects and, perhaps, not scraps, but I wasn't going to be the one to mention that to my Dad, for he was the timber baron in our house.

After I began working at White Bear Yacht Club, a new initiative in wood hoarding took place. Under paternal mandate I was directed to seize any and all splitable wood taken from the course. This to be added to the now very well-aged stacks and stacks of wood wedged between trees in our backyard. The directive was modified to exclude

any and all elm wood as, and I can still see his hand description, "That wood is damn hard to split because it twists as it grows".

Soon I was scouting the WBYC property to supplement his desires. Cushman loads of bounty were carted to his property, much to his delight. Some was burned, some was stacked, some was stored and, to this day, I still can identify logs imported for the creating of a retaining wall system of sorts. At the time I was becoming indoctrinated into the wood-hoarding compulsion and ever since I have been looking for dry timber to remedy my own addiction for firewood.

My former house had a woodburning furnace inside. Not one of those supplemental heaters, but a grand daddy unit capable of consuming five-foot long pieces of wood – I even think I drooled when I realized the potential for woodsmanship in such a grand scale. Impressive to say, but considering the furnace was in my basement, I had no good indoor location to store daily supplies of firewood of that size. So I logged my wood into 20-inch lengths and, to take my production to the next level, I purchased a log splitter.

With this investment I had made it possible to split massive amounts of firewood. Cords and cords graced my yard and created an indescribable personal pride, for surely my neighbors or anyone else observing my arrangement developed wood envy (however, I think it was one of the issues that led to my first divorce). I had become my father's son, a full-fledged wood hoarder.

Actually, we are everywhere. Just drive around town and you can pick us out. Typically we have an outdoor fire pit in the back yard and a fireplace stack protruding from our roof tops. Between trees or stacked next to the garage, perhaps under an old canvas tarp, an aging half-cord waits for the beckoning of a chilly fall evening or the urge to make a s'more.

Wood hoarders don't belong to any club, but we appreciate a dead or dying tree and size up amateur removal probabilities voyeuristically. Northern Hydraulics catalogs capture our gaze as we reminisce about logs so large they defied our meager homeowner splitters and remain in the "too big to split" pile. We ponder the value of our log piles, envy bigger hoards and consider the potential of actually selling or bartering our laborious hobby. NOT. And with mild embarrassment we look away when a non-hoarder purchases a net wrapped bundle of three logs from the gas station for five dollars.

Currently, I have two log piles nestled in the woods of my yard and one paltry stack by the deck door. All quite diminutive compared to my historical standards because, although my wife is the most understanding person in the world, she doesn't appreciate my natural fetish. Also, I am very interested in maintaining a healthy relationship with her. What she doesn't know

is that I have a monstrous pile, at least eight cords big (full man cords) behind the shop from which I supplement my deck stash! Actually, I feel sad for her as she just cannot enjoy my obsession.

Alas, someday I, too, will be told that I must curtail my wood-hoarding habits. Like my father's, my body will rebel against the backbreaking toil of creating an ever larger wood pile. The doctor will prescribe activities not including tree removal, log splitting and the accumulation of wood for future consumption. But you will never be able to keep this wood hoarder from dreaming of creating vast piles of drying logs. The splinter, the chaff of skin and the near miss of the hydraulic ram; the smell of exhausted petroleum, wet wood and bark fungus; the sound of crashing timber, splitting logs and the muffled chainsaw; the production of neat rows or conical piles of wood, split 20-inch pieces of wood. In my mind's eye, the wood hoarder's Mecca.