

Hole Notes

The Official Publication of the MGCSA

***Emerald Ash Borers:
Still on the Move!***

Vol. 55, No. 4 May 2020



**Corona Pandemic
Response materials can be
found at GCSAA.Org
Pandemic Pages**

On The Cover

Moving south to north, east to west and along our freeway systems burrowed in transported firewood from infested areas, the Emerald Ash Borer Beetle is quickly ravaging our ash tree forests. Do your part to control this nasty insect and limit the damage to the states most prevalent tree. Their feeding tunnels ruin the vascular system of infested ash tree. Read: *Emerald Ash Borer Beetles. Here Today and Here to Stay*** on pages 12 - 20**

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Presidential Perspective

by Scott Thayer, Legends Club

Another crazy month for golf in Minnesota!

As I write my May column, it seems that the conditions surrounding golf and the turf industry have changed, yet again. The many individual member requests to get maintenance opened up were powerful and heard; thank you to those who pursued their personal legislative contacts. Subsequently, opening for golf required the same emphasis. Together, our active membership worked diligently with the other golf allied associations to promote that golf can be played safely, with best practices and social distancing. Surprisingly, and quite rapidly, the results of our efforts were known.

I remember Friday, April 17th, very well. All morning long I had received many text and emails from

people in the industry and friends, regarding the play of golf and the announcement to be made during the Governors press conference later that day. I didn't know what to expect. Other states had allowed golf to open; walking only, 15-minute tee times, just two-somes and/or other special requirements. In all cases, the announcement came with a projected date and time, at least enough to prepare the course for when golf could be played again.

As you know, our Governor decided otherwise. He declared late Friday morning that play of golf would be allowed beginning at 5:00 am the very next day! I heard the news around 11:15 a.m. on the 17th, and my head began spinning. Quite frankly, I'm not sure if it has stopped! Prior to prepping my course, it was important for me to make sure that everyone knew what was going on. First and fore-

most, letting the MGCSA membership know, followed by the golf allied associations, my owner, GM and of course, my staff. The “rush” was intense!

However, the reality was that the Legends Club still had snow on the course. At a minimum, my staff and I needed to clear all paths, cut cups and put tee markers out just to be ahead of play the next day. We did so much more, but it was such a whirlwind of activity I cannot remember everything! After all of our hard advocacy efforts I was so very happy golf opened, but I was not

fully prepared that it would happen as fast and without lead time. On opening weekend, we had 400 golfers and I know the clubhouse staff was overwhelmed as well. Although there was very little social distancing guidance in the executive order, I felt very comfortable opening because the golf industry had already created a template for Best Practices. We were ready to make sure precautions were met and followed. The GCSAA came up with the “Back2Golf” campaign and other helpful tools, which were quickly placed upon the MGCSA website for all golf destinations to use.

GCSAA 2020

Back2Golf Pandemic Resource Toolbox

Minnesota Chapter



GCSAA

Golf Course Superintendents Association of America

After three weeks of being open, I feel we all have a better understanding and process of how social distancing can take place and be followed. By now you have witnessed that some golfers are really good at making sure that social distancing is happening, and some players could not care less. Those are the toughest people to have on the course, and make it difficult to carry out all the proper rules associated with golf.

From a maintenance perspective, I feel the cart traffic is the hardest to deal with now that we are open; four carts per group, one rider per cart is crazy. The rough is taking a beating like I have never seen before, this early in the year. The temperatures are cool, and the turf doesn't have time to recover like it would in the summer. Golf will be different, to say the least, not just maintaining golf courses and how we will manage turf, but also how golf is delivered to players.

Legends would normally be starting corporate events in May. This year, outings have been re-scheduled beginning in late June, and most have been pushed to the fall or canceled completely. Needless to say, the 2020 golf season will be very different! As a silver lining to the situation, in talking to our general manager about some of the people that have been coming out to play, he says the regulars of course have shown up, but there have also been a lot of new faces and many newbies to the game of golf. Because there is not a better socially distance recreation than golf during the pandemic, I have been thinking, "could this pandemic be good for the game?" "Yes", I feel at this point in the pandemic that it is positive. However, it will be interesting to see what happens as other recreational opportunities open up after May 18th.

Good luck to all as the season continues, stay safe and be healthy.

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Reinders



2020 Legacy Scholarships

Deadline for Application:

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The Program: The Minnesota Golf Course Superintendents' Association offers a scholarship program designed to assist children and grandchildren of Class AA, A, B, C, D, EM, Associate and Affiliate members. The MGCSA provides scholarships to students attending college or vocational programs at any accredited post-secondary institution. The program is independently managed by a group of select unbiased academic advisors. Awards will be granted without regard to race, color, creed, religion, sex, disability, national origin or financial need.



The Joseph S. Garske Legacy award, named after the founder of Par Aide Products Company, Joe Garske, is committed to further the education of children and grandchildren of MGCSA members through financial contributions. This is the 24th consecutive year for these awards. Par Aide is located in Lino Lakes, Minnesota and owned by Steve Garske, son of Joseph.

The late Mr. Garske, who died at the age of 76 in 1982, started Par Aide in 1954 with plans to make a "good" ball washer. A foundry man and avid golfer, he knew little about the golf business, tried to sell his ideas

for design and tooling to two accessory companies, was turned down by both and so began Par Aide Products Company. Steve Garske started The Legacy Scholarship in his father's honor in 1996.

Selection of Recipients: Scholarship recipients are selected on the basis of academic record, potential to succeed, leadership and participation in school and community activities, honors, work experience, a statement of education and career goals and an outside appraisal. Selection of recipients is made by a select group of academic professionals. In no instance does any member of the MGCSA play a part in the selection. Applicants will be notified by the end of July whether they have been awarded or denied a scholarship.

Eligibility: Applicants for the MGCSA Legacy Scholarships must be: children/grandchildren of Class AA, A, B, C, D, EM, Associate or Affiliate members who have been members of the MGCSA at least five years; High school seniors or graduates who plan to enroll or students who are already enrolled in a full-time undergraduate course of study at an accredited two- or four-year college, university or vocational-technical school, and under 23 years of age.

Awards: Three awards will be given to children and grandchildren of Class AA, A, B and C members. One award of \$1,500 in the name of Joseph S. Garske will be given to the highest evaluated applicant. That award will be renewable for one-year contingent upon full-time enrollment and satisfactory academic performance. One other \$1,000 award will be given



to other qualified applicants from this group. One, \$1,000 award will be available to children and grandchildren of Class D, EM, Associate and Affiliate members. These awards are not renewable. However, students may reapply to the program each year they meet eligibility requirements. Awards are for undergraduate study only.

Obligations: Recipients have no obligation to the MGCSA or its members. They are, however, required to supply the MGCSA with current transcripts and to notify the MGCSA of any changes of address, school enrollment or other relevant information. Except as described in this brochure, no obligation is assumed by the MGCSA.

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THE SOIL EXPERTS.

Emerald Ash Borer Beetles: Here Today and Here to Stay

Jennifer Burrington, Minnesota Department of Agriculture

Have you ever been walking down a fairway and noticed how trees can perfectly frame a green or noticed the role trees can play in the difficulty level of a certain hole? What if those trees were gone? Would you still enjoy playing the course? Emerald ash borer (EAB) is killing ash trees in Minnesota and your local golf course, along with hometowns, may have a new look in the years to come.

The emerald ash borer, *Agrilus planipennis*, is an invasive wood-boring beetle native to Asia and first detected in North America in 2002 near Detroit, Michigan. Since that time, EAB has been responsible for killing millions of ash trees as it has spread across the eastern half of North America. In Minnesota, EAB was first discovered in 2009 and has been detected in 21 counties as of October 2019. Minnesota is home to almost a billion ash trees comprised mostly of three species of ash that are highly susceptible to

attack by EAB, green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), and black ash (*F. nigra*).

A single generation of EAB is completed in one to two years. Eggs are laid during the summer on trunks and branches of ash trees. Larvae hatch from the eggs and tunnel beneath the bark. Larvae make distinct “S”-shaped (serpentine) galleries and feed on the phloem of the tree. Larvae may spend the winter inside pupal chambers in the outer sapwood, bark, or in feeding galleries, and some larvae will feed for another summer before completing development.

Adults emerge from ash trees through a distinct “D”-shaped exit hole May through September. Upon emergence, adults will feed on ash leaves in the canopy before mating and laying eggs. Trees are killed by continual insect larval feeding, and tree mortality accelerates as EAB population density increases.



Although adult beetles can spread a few miles through flight, the primary means EAB spread to new areas is through transport of firewood or other wood from ash trees. Once EAB reaches a new area, it will often be there for 4-5 years before the population is abundant enough to cause noticeable symptoms, and without aggressive management, within another 4-5 years many of the ash trees may be dead.

The loss of ash trees has a variety of environmental and economic impacts upon infested areas. A large concern is the role ash trees play in mitigating water runoff in communities as well as riparian areas. Trees are important for slowing and

reducing storm water runoff. Ash trees are not necessarily better suited for this purpose than other types of trees but losing many of them in a short amount of time potentially means more water carrying more silt and other materials into waterways. For homeowners and outdoor enthusiasts, ash trees provide vital shade in the summer heat waves and wind breaks in the blustery cold winds. On golf courses trees are important for aesthetics and as functional course features such as defining doglegs.

Economically, EAB can have big impacts on the budgets of homeowners, golf courses and local governments. As EAB has moved across the United States, we have



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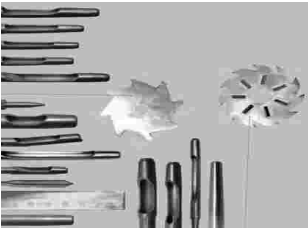


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seen that nearly 100% of the ash trees growing in the region will likely be killed by EAB if they are not preserved with insecticide treatments. This means that every ash tree growing along a street, along a fairway, in a yard, at a park, or in some other area used by people will either need to be treated, removed or be expected to die. Ash trees also quickly become hazardous soon after being killed by EAB.

Due to this hazard they can't be left standing dead in places where they may threaten life or property. When you consider that many trees can be affected over just a few years after the discovery of EAB, it is easy to see how the costs can quickly add up.

For golf courses, communities and other places where people live, preparing for EAB in advance is

an important step in the long-term preservation of the existing tree canopy and the benefits it provides. One of the first things to do is to determine how many ash trees are on your property. This is more easily done by a homeowner than a city or golf course, but the reasons for making the inventory are the same. Without a clear idea of what you have at risk, it is impossible to make a good plan for managing the problem.

By inventorying the ash trees on a property or in an area, the landowner or community can begin

to make some decisions about what will happen. Trees that are in good health and in good locations may be good candidates for insecticide treatment, while some trees may have structural or other issues that make them better candidates for removal. Certain trees may be small enough or in locations that make them suitable to ignore and allow nature to take its course when the time comes. As a plan is developed, there is also opportunity to calculate what the plan will cost to implement. For a homeowner, contractors can be brought in to give cost estimates for treatment or



removal. For a golf course or city, an excellent online tool is available from Purdue University (EAB Cost Calculator) that will provide predicted costs given a particular management strategy and tree inventory.

Once a plan is in place, implementation is the next step. It is not uncommon for EAB populations to be sufficiently high enough to cause some trees to be declining or dead before the insect is discovered in a new area. However, the risk of this occurring to an individual tree is very small, particularly the farther the tree is from existing infestations. Typically, EAB infestations are discovered before more than a small percentage of trees are affected in a given area. When considering the treatment of trees, this is an important consideration. The risk of EAB damaging a tree or trees is small, but it is not zero.

Some trees may have enough value to the landowner that they are willing to accept paying for preemptive treatments to avoid the risk of EAB killing their trees. The nearer EAB has been found relative to the trees you care about, the

greater the risk. For Minnesotans, EAB status can be tracked to the community and often neighborhood level using the Minnesota Department of Agriculture's website which tracks all known areas of infestation in the state (www.mda.state.mn.us/eabstatus). It is not unreasonable to postpone treatment until EAB has been discovered relatively close to your trees, such as in your city or neighborhood.

For situations where trees will be removed rather than treated, it may be important to begin implementation earlier rather than later. This is particularly true where there are many trees on a property. The danger is having tree removal lag tree mortality. Emerald ash borer populations develop slowly at first without many symptoms visible. Once populations are abundant enough for visible symptoms to occur, the population begins growing rapidly. It is very difficult to keep up with tree removals if left until trees begin to die. Additionally, removing many mature trees at one time will have significant negative impacts on storm water runoff, air quality, property values, aesthetics, etc.



Removing and replacing a smaller number of trees over a longer period of time reduces the negative impacts of tree removal. To do this without using insecticides, however, will require golf courses and other large land owners to start well in advance of EAB detection.

The most common way for EAB to be found in a new area is for someone to recognize the symptoms of infested trees and to report them to Arrest the Pest [www.mda.](http://www.mda.state.mn.us/arrestthepest)

[state.mn.us/arrestthepest](http://www.mda.state.mn.us/arrestthepest). The most common symptoms of EAB infestation are woodpecker feeding damage and bark splits that open vertically on the stem or branches of ash trees. However, these are symptoms and can be caused by other things as well.

Trees that exhibit these symptoms should be inspected more closely for the characteristic “S”-shaped larval galleries left behind under the bark where EAB larvae

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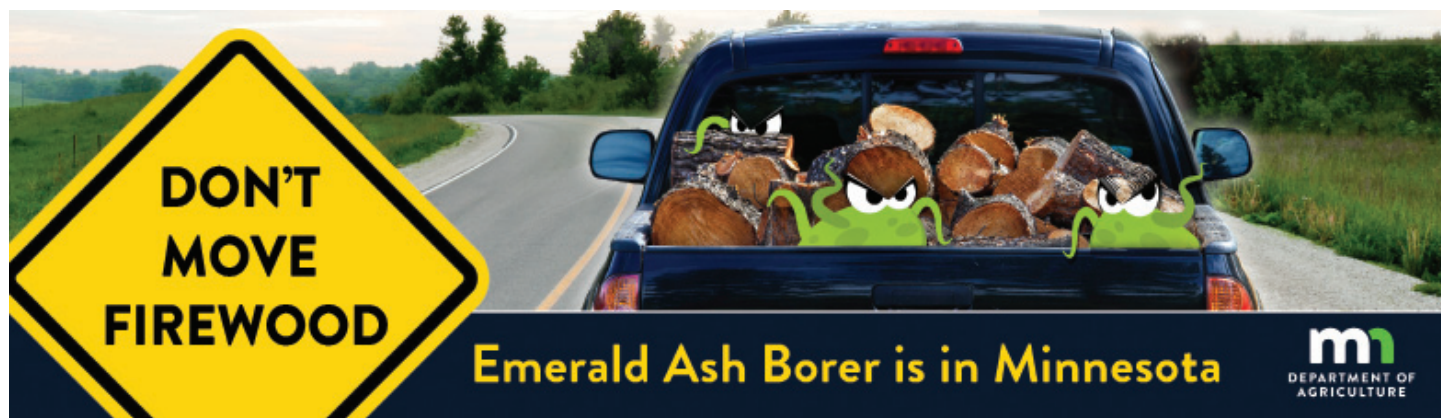
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have tunneled. If this damage is seen, the tree should be reported.

Reporting new areas of EAB infestation is one of the best ways that citizens can help to slow the spread of this invasive pest. Another is to take steps to not accidentally move EAB to new areas. As described earlier, EAB is very easily moved within infested ash wood, and the way it is most commonly moved is as firewood. This is a difficult pattern to break. Many of us are in the habit of moving and using firewood without much thought as to what might be inside. Despite all the trouble that EAB has already

caused across the country, much of Minnesota is not yet infested. The best way to keep these areas free from EAB for as long as possible is to not move firewood.

The Minnesota Department of Agriculture has many resources available for homeowners, golf course managers and municipalities. For a more in-depth look at all the options and steps in preparing for and managing EAB, please read the Guidelines to Slow the Growth and Spread of Emerald Ash Borer found at www.mda.stat.emn.us/eab.



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“In the Hole!!!!!!”

by Matt Cavanaugh, Rush Creek Golf Club

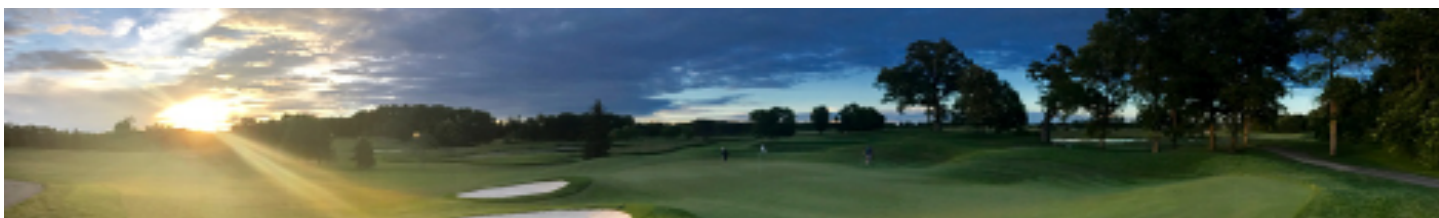
In The Twilight of Twilight

“If people aren’t calling you crazy, you aren’t thinking big enough.” Richard Branson, you had me at crazy.

Challenge accepted, so here goes. A time of change is upon us in the golf course industry. No bunker rakes, no ball washers, one golfer per cart and of course the pool noodles. For me it has always been very refreshing to find a new way to do things. Sometimes it works and sometimes it doesn’t. I do embrace change, but I don’t want you to think that I search out change just for the sake of change. If there is a better way to do something though, I will do it. The change I’m currently thinking about will be eliminating a norm in the industry that has been expected for generations. Well, golf world, prepare to call me crazy and in the meantime, I’ll start getting the “you’re welcomes” ready once the golf community embraces my proposed change. Here goes.

I find the industry stalwart of twilight tee times at public golf course facilities absolutely ridiculous and detrimental to the financial well-being of public golf courses. Twilight tee times are available for a reduced price compared to the previous tee times of the day. The premise, and I hope the initial intention, of twilight golf was to obtain additional revenue from golfers that know they are not going to finish their round of 18-holes. If a golfer wants to head out knowing there is no ability to finish, by all means the industry should take their money.

The problem I have is that for much of the industry twilight golf starts



way before “twilight” when the golfers actually have the ability to finish their round. When that is the case, the industry is just giving away revenue for no reason. Twilight is defined as “the soft glowing light from the sky when the sun is below the horizon, caused by the refraction and scattering of the sun’s rays from the atmosphere.” Now, I understand that I’m taking that definition of twilight a little too literally in terms of how golf uses the term, but let’s take a look at how Minnesota golf courses define and use “twilight” golf.

I looked at twenty different public golf courses throughout Minnesota and found that a majority of courses start their twilight tee times at 3 p.m. (11 courses) with others advertising a 4 p.m. (7 courses) twilight start. I was shocked to find courses also have a 2 p.m. (2 courses) twilight start. With the true intent of “twilight” golf, we allow golfers to stay out on the course until it is nearly dark. This is called civil twilight. Civil twilight is defined as “the period after sunset when the sun is 6 degrees below the horizon and during which on clear days there is enough light for ordinary outdoor occupations”. In case you didn’t know, civil twilight is different than astronomical twilight and nautical twilight which are both later into the night. Here is a list of civil twilight end times throughout the summer in Minneapolis:

1. May 15th 9:10 p.m.
2. June 15th at 9:39 p.m.
3. July 15th at 9:32 p.m.
4. August 15th at 8:50 p.m.
5. September 15th at 7:52 p.m.

Let's focus now on the majority which is advertising the 3:00 p.m. "twilight" tee time. Assuming a 4 hour-20 minute 18-hole round and 10-minute intervals between tee times, here are how many tee times in Minnesota that will finish the round before dark:

- May 15 – June 14: tee times from 3:00 to 4:50 p.m. = 48 tee times/day at a reduced rate.
- June 15 – July 14: tee times from 3:00 to 5:20 p.m. = 60 tee times/day at a reduced rate.
- July 15 – August 14: tee times from 3:00 to 5:00 = 52 tee times/day at a reduced rate.
- Net = 4,800 potential tee times at a reduced rate that will finish before dark over these roughly 90 days.

These same twenty public golf courses at the start of "twilight" tee times, are offering, on average, a discount of 33% and over this 90-day period these courses have reduced revenue by \$112,000, on average when looking at a 3 p.m. "twilight". Move to a 4 p.m. "twilight" time and it's still \$61,000 on average. I count it as lost revenue because the rounds are being finished and thus should not be discounted as "twilight" rates. Just looking at the math, it's hard to argue for twilight rates.

I get it though, having a "twilight" tee time is part of the history of the game and you can't mess with the history of the sacred game of golf. One other thing you can't mess with, in my eyes, is supply and demand, simple economics 101 that the golf course industry completely forgets. In perfect competition, the quantity demanded (golfers) and the quantity supplied (tee times) will be equal. If the demand increases and the supply remains the same, there will be a shortage and the price will increase. If the demand decreases and the supply remains the same, there will be a surplus

and the price will go down. Just look at the recent changes in gas prices. With everyone staying at home, the demand has gone down, resulting in a surplus in the market and thus a reduction in the price per gallon of gas.

In golf, I argue that the twilight rate (3-5:00 p.m.) comes at the time when the demand from golfers is at the very highest during the day, especially on the weekday. This is the time when the majority of the working population is getting off of work and will have free time to golf, thus increasing the demand for the small surplus of tee times from 3-5:00 p.m. With the demand at the highest, the industry decides to decrease the price by 33%. Conversely, the industry decides to have the highest price when the demand is the lowest, before 3:00 p.m. especially during the weekday. With all of this, the twilight rate should start no earlier than 5:00 p.m.

Golf chooses to have a reverse happy hour. Just think if a restaurant held their happy hour during the busy dinner rush. Restaurants don't, they advertise a happy hour when the demand is the lowest. Movie theaters get it also. Have a lower matinee price (when people are at work) and then increase the price back to normal to capture the increased demand when people are off of work, brilliant!

So, there you have it. Public golf needs to get rid of the early twilight rate. It is already hard enough to make money on Minnesota public golf courses. An industry with a compressed time to make money and it decides to reduce rates each and every day during peak demand. Sure, have a twilight time. It just needs to be late enough that people actually do not finish their round. Golfers know what they are getting into. As an industry, we continue to hear stories of public courses just getting by and municipal courses operating at a loss with citizens wanting something else done

with the land other than a golf course. To me, a start would be to actually increase revenue during a time that has the highest demand. Each and every weekday from 3-5:00 p.m. should be treated like Saturday and Sunday morning. I did find a few (and only a few) cutting edge courses that do have twilight tee times after 5:00 p.m. and as we know many courses provide evening leagues during the week. Why are the majority of leagues in the evening? Oh yeah, people are off of work. With that, there are still many courses that participate in the “twilight” rate.

I don’t understand why the industry feels they need to provide a 33% discount every day during peak demand times and, on the flip side, why do all golfers need to have a “deal” to play golf considering golf is a product that is very expensive to produce in a climate that has a limited time to offer said product. What do golfers think this is, Kohl’s?





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Improving Turfgrass Winter Stress Tolerance Through Plant Breeding

Eric Watkins, University of Minnesota, PhD Turfgrass Breeding

Over several recent issues of Hole Notes, researchers in the turfgrass breeding program at the University of Minnesota have described approaches used to develop new cultivars for use on golf courses and other landscapes. In the first article, I gave an overview of plant breeding and genetics. Next, Dr. Garrett Heineck described how turfgrass breeders assess plant quality in field experiments using a variety of approaches, including digital image analysis. In the third installment, Dr. Dominic Petrella showed how he has developed new methods for selecting turfgrasses that are more tolerant of growing under tree shade. Finally, Dr. Yinjie Qiu wrote about using molecular tools to identify and improve turfgrasses. All of these approaches are important in any plant improvement project.

If you are active on Twitter, you likely have heard about the “WinterTurf” project, an effort led by the University of Minnesota with collaborators at the University of Wisconsin, University of Massachusetts, Michigan State University, Rutgers University, Iowa State University, Oregon State University, and the Norwegian Institute of Bioeconomy Research. This project is a great example of how the development of new cultivars by plant breeders is often supported by multidisciplinary teams of researchers.

Winter stresses are very complex and difficult to study. To illustrate this problem, let’s consider just one way that turf can die during the winter: ice cover. We know that there are differences in how turfgrasses respond under ice; for example, Kentucky bluegrass can

generally survive much longer under ice than can perennial ryegrass.

As a plant breeder, I might want to select perennial ryegrass plants that do better under ice. I would do this by subjecting mature plants to ice cover and then selecting the top performers for future crosses, eventually leading to a new variety. The challenge comes in deciding how to do this type of selection. Ideally, this selection would take place in the field

since that is where the turfgrass will ultimately be grown. We have tried this previously and run into a number of challenges including stretches of temperatures too high for maintaining ice cover and variability in field characteristics such that ice depth varies from plot to plot.

Since the field doesn't work well, the next option is a controlled

environment, such as a low-temperature growth chamber. We tried this a few years ago by growing plants in cone-shaped pots and then placing an aluminum ring at the top; water was poured onto the plant and the ring kept the water

from moving while ice formed. We thought this worked really well, but when we analyzed the data we found results that were sometimes the exact opposite of what we'd expect in the field. We



think that the complexity of how ice forms in the field hampers our ability to recreate those conditions in the lab. If you consider how ice might form on a green, there are a number of variables. How much moisture was in the soil when the ice formed? Was the grass actively growing? Was the ice that formed clear or opaque or something in between? The list goes on and on. We

could make some educated guesses and move forward with this type of screening, but a data-driven approach is preferable (figure 1).

Previous efforts to study winter stresses of cool-season turfgrasses have been limited for a number of reasons, but the one overriding factor is that we don't always know how turf is dying during the winter. You might find dead turf after snow melt, and have some idea of what happened, but pinpointing the exact cause is dif-

ficult. Furthermore, winter damage is sporadic. Some years, only a few courses in Minnesota are affected, while in other years dozens of courses sustain significant damage. Researchers need data to understand this stress, data that is hard to come by because winter damage only happens under certain environmental conditions, which may only be present in a small percentage of winters at a given site. We can overcome this challenge by taking a broad, international look at winter stress damage.



Figure 1: What is really happening over winter under the cover or blanket of snow? Is the data quantifiable?

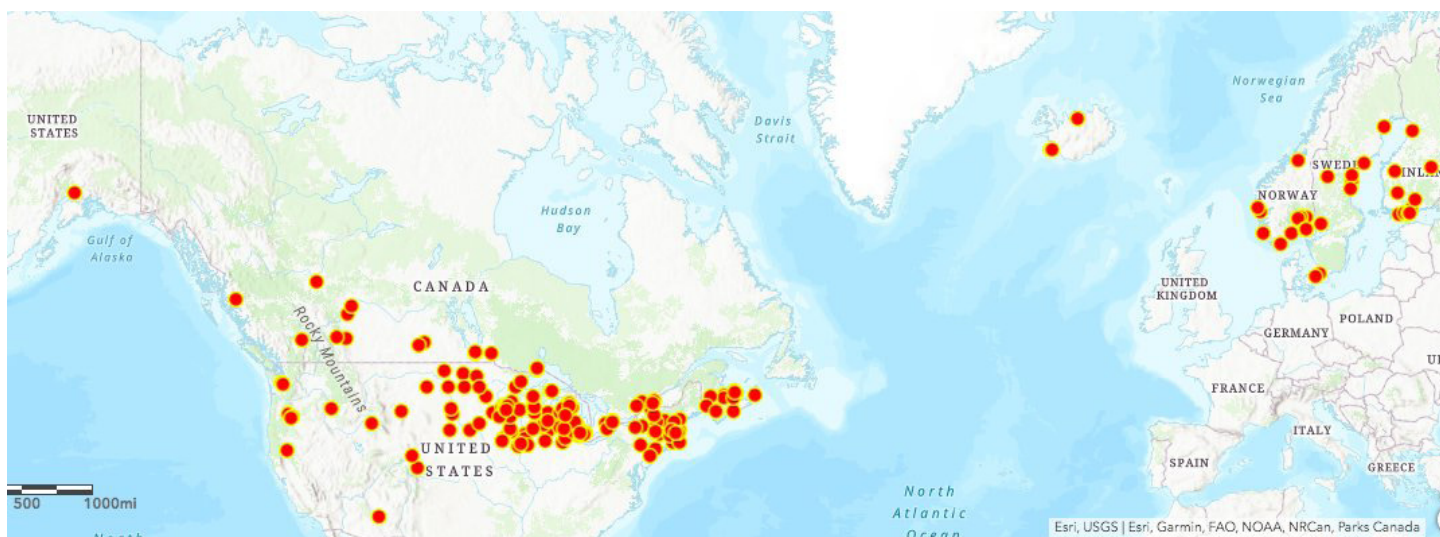


Figure 2: Locations of golf courses where superintendents have agreed to collect data for the WinterTurf project.

Our approach in WinterTurf is to think of winter stress damage on a larger scale. Over 240 golf course superintendents from across the northern U.S., Canada, and Scandinavia (Figure 2) have agreed to help us collect data each week during the winter of 2020-2021 on between 1-3 golf greens on their golf course. Superintendents will measure snow depth on several locations on each green, and then also record observations such as how much ice or water is present. Fall management information (amount of N applied, fungicides, etc.) will also be requested so that we can determine if certain management approaches help or hinder winter performance of golf greens. Before and after winter, the superintendent will take an image of the green

so that we can determine how much of the turf died or didn't die from winter stress. We are calling this type of data "human-sensed" data.

For all of these courses, we will also, pending funding, download satellite images. A subset of the courses will also receive sensor nodes (Figure 3) that will record various environmental parameters including soil temperature and moisture (3 depths), light, oxygen, and carbon dioxide. We hope to collect drone imagery as well on a few courses in the Twin Cities. All together, we'll have several layers of data depending on the course: human-sensed data, weather data from nearby or on-course weather stations, environmental sensors,



Figure 3: Sensor nodes were installed at three Minnesota golf courses and at the Turfgrass Research Outreach and Education Center in St. Paul in November 2019.

satellite imagery, and drone imagery (Figure 4). Computer scientists and agricultural modelers can then take all of these data and look for patterns that help explain winter stress damage. For instance, we might find that ice formation on actively growing creeping bentgrass has a high chance of causing damage, while ice layering on top of dormant creeping bentgrass is not a problem when soil moisture levels

are below a certain threshold (these are just examples--we won't know the answers until we analyze the data).

Our hope is that these data will be useful in tackling the aforementioned problem of designing better selection protocols for ice cover stress. Perhaps we will learn more about the best soil moisture under which to stress the plants,

or the amount of light that should be present in the growth chamber. Once we determine proper screening conditions and optimize protocols, we can work identifying genes responsible for winter stress tolerances and then apply what we learn to the development of new cultivars with enhanced winter stress tolerance.

The outcomes of the golf

course data collection effort are not limited to plant physiology and breeding. The most exciting part of this project for the golf course superintendent is the remote sensing results should help inform research into better management practices for preparing for winter, during winter and during recovery. In addition, we are partnering with Len Kne at U Spatial (<https://research.umn.edu/units/uspatial>) to develop an

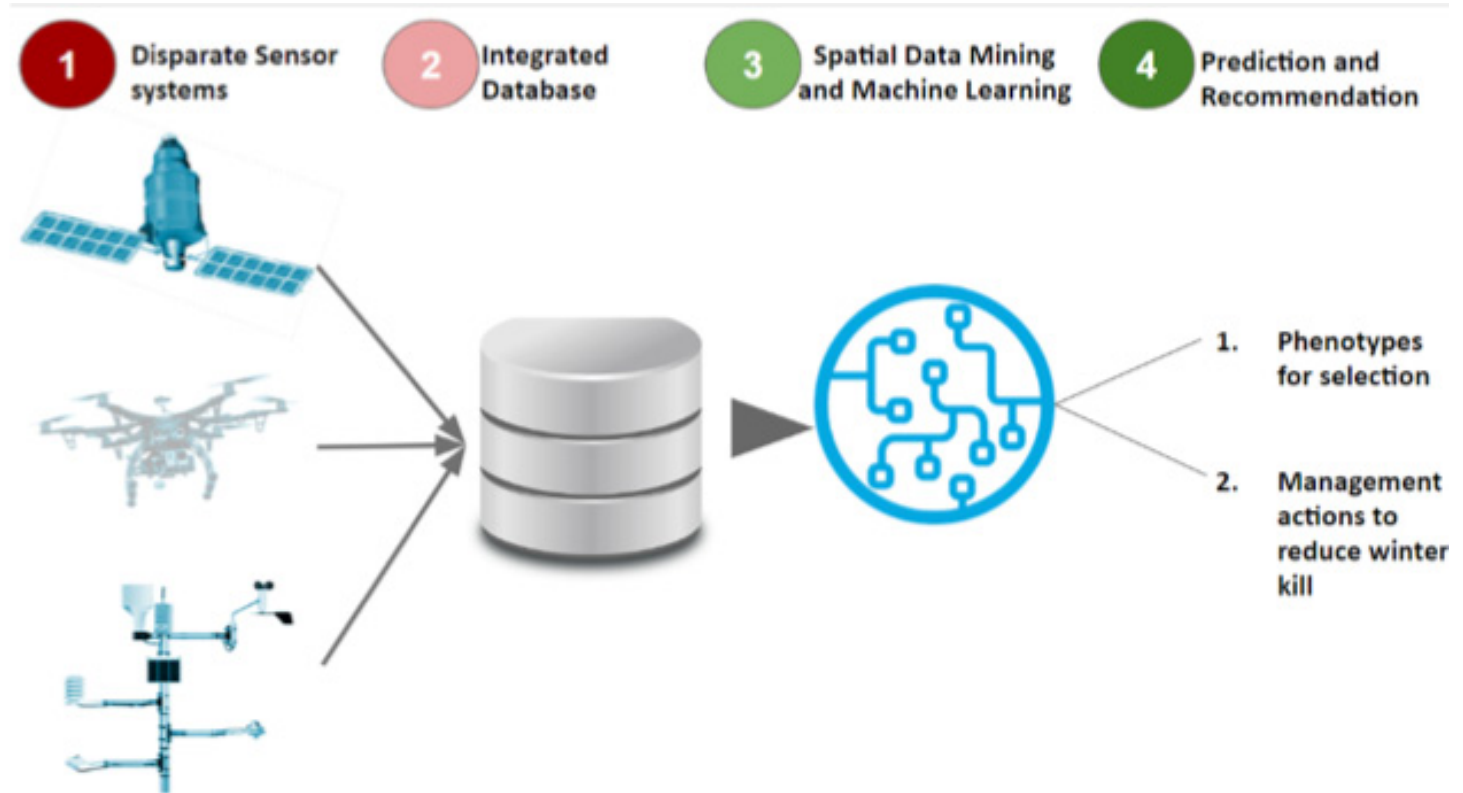


Figure 4: Multiple sensing system platforms will be integrated into a comprehensive database. These data will then be used to drive spatial data mining and machine learning, which result in predictions and recommendations relevant to winter turf management and breeding. Figure courtesy of Bryan Runck, G.E.M.S., University of Minnesota.



You don't know what you don't know. Could winter stress sensors will help with future planning? Photo courtesy of Aaron Porter.

online dashboard that would give real-time data for your course and nearby courses, including sensor data, recent weather, and a winter stress prediction model, built off of the remote sensing work I described earlier. Imagine you have a sensor node on a green you know is prone to winter stress damage. The prediction tool would monitor the real-time readings from the sensor nodes, and then using that information along with any other available data (satellite imagery, weather, species information, fall management information) give a risk score—at some threshold it would tell you that you should take action. This approach would take a process that is

now based on some guesswork and make it one that is data-driven.

The goals of the WinterTurf project are exciting and could be very impactful; however, this work will take a lot of time and significant resources. Funding from the MGCSA Member-Driven Research Program is getting this project off the ground, which I hope will lead to additional funding opportunities from national turfgrass groups and federal agencies. Our collaborator Bryan Runck and his team with G.E.M.S. at the University of Minnesota (<https://agroinformatics.org/about-us/>) built and deployed several sensor nodes this past winter

to determine the challenges of installation and data acquisition; they are now working on improvements to the sensor node design for future winters. Our current plan is to put sensor nodes on at least 10 golf courses in Minnesota during winter 2020-2021; however, we are seeking additional funding to expand this to a greater number of courses both in Minnesota and other cold climates.

If you've made it this far, you may recall that this article began on the topic of plant improvement. The WinterTurf project aims to tackle a vexing problem by involving experts from several disciplines. His-

torically, many major plant breeding advances have been due to teams of researchers working collaboratively, and our hope is that this project will be yet another example. In our turfgrass breeding program, we will use results from remote sensing to design better field and laboratory screening methodology, and then use molecular approaches to identify genes that are involved in winter stress responses. Using all of these approaches will help us on our journey to developing turfgrass cultivars that are able to live longer under ice cover, withstand extreme low temperatures, and fight off snow mold infection.

The Minnesota Golf Course Superintendents Association wishes to thank Dr. Eric Watkins and his team of University of Minnesota Turfgrass Scientists. We find great value in the research you are conducting on the behalf of our industry. By working together, we can unravel some of the mysteries of turfgrass management.

IRRIGATION

WATER WISELY: QUICK TIPS TO READY FOR THE IRRIGATION SEASON

 PAUL ROCHE - APRIL 12, 2016



The irrigation season is just around the corner and preparing your system for what lies ahead can help put you in the best possible position for irrigation success. There are several components of the irrigation system that can be easily checked and adjusted to ensure proper performance. There are also a few steps that can be taken to fine-tune areas that can make the system more serviceable.

Central controls are the brains of the irrigation system. A best practice to ensure you are ready for the irrigation season is to perform the following simple maintenance procedures:



Active sprinkler

- **Back-up all programs and databases.** Some manufacturers offer an online service or you can easily backup yourself onto a flash drive. Keep the flash drive stored in a safe place in the event it is needed and consider doing a weekly update to include new programs that you create throughout the year.
- **Renew or ensure you are current with your control system service plan** so that you have the support from your irrigation equipment manufacturer for online or on phone technical support and next-day replacement components.
- **Grounding and surge protection devices** should be checked to ensure that your electronic equipment is protected going into lightning season. This service is typically offered by the manufacturers authorized distributor for the equipment or a qualified golf course irrigation contractor.

Sprinklers are probably the most important component of the irrigation system and because they are responsible for distributing water across your golf course, they need to be checked on a routine basis. Some simple maintenance procedures will ensure that they are ready to perform when needed:

- **Level sprinklers** will distribute water more evenly. A field level (electronic or mechanical) or app on a cellular phone can be placed on top of a sprinkler to determine if a sprinkler is level or tilted. One field test showed that two sprinklers in a pattern that had a 3-degree tilt affected distribution uniformity by 10 percent, which can cause increased runtimes and exaggerated wet and dry spots due to the less uniform distribution of water. Upon leveling, the sprinklers uniformity increased from 71 percent to 81 percent. Level sprinklers so that they are no more than 2 degrees from level.
- **Visually inspect sprinklers** to ensure that they are rotating properly, nozzles are not clogged or obstructed, and part circle sprinklers are properly adjusted.
- **Replace defective internal assemblies or drive assemblies with new ones.**



Water distribution audit



Sprinkler level check

Water distribution audits should be conducted on irrigation systems that are five years or older to ensure that expected uniformity is being achieved as nozzles can wear over time and change water distribution patterns and uniformity.

Valves and valve boxes are often overlooked but they are key components of a properly functioning and serviceable irrigation system. For instance:

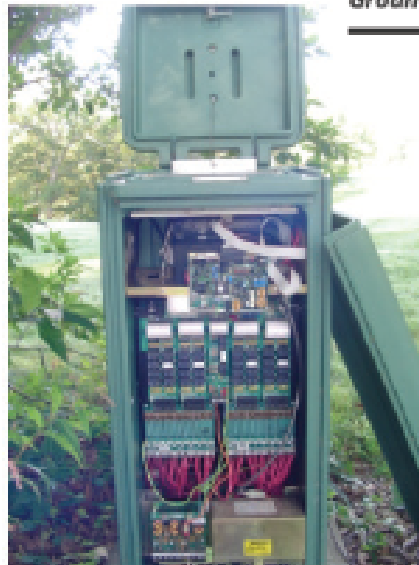
- **Air release valves** are an important part of any irrigation system. An air release valve will continually vent air from the system. Air can be a very destructive force as it is compressible and can violently exit the irrigation system through sprinklers. When this happens, water accelerates at high speed to replace the air which creates water hammer. Make sure air release valves are open and operating correctly.
- **Drain valves** should be closed and visually inspected to determine they are not leaking. For systems that have been winterized, an overlooked open drain valve is not uncommon and can be the reason for the pump station cycling.
- **Isolation valves or mainline gate valves** should be checked to see that they are open and that they are accessible if needed through the season. They should be clearly marked on the record drawing. Being able to quickly locate and access

an isolation valve in the middle of the season, if needed, is very important to help facilitate system maintenance or repair. Consider using a different color valve box cover to help easily identify them on the golf course.

- **Quick coupler valves** can easily get lost over the winter months. Locate and test quick coupler valves so they are ready for action when needed. It won't be long before hose-end watering is needed, so it is best to be prepared. Consider installing additional quick couplers in areas that require regular hand watering to help reduce the labor to get hose-end water to those areas on the golf course.
- **Valve boxes and valve box covers** protect components and help ensure easy access and service as needed. Replace any broken boxes and have some spare covers available so they can be replaced as needed.

Controllers are often overlooked. They should be checked and tested before the main irrigation season begins. Here's what you can do:

- **Test each station** to ensure that each station output circuit and solenoid is operational. Winter lightning and surge can blow fuses or damage solenoids so be prepared to make those replacements if needed. Leave a spare fuse or two in each controller in the event one is needed during the year.
- **Infestations** of mice, insects and other pests are quite common during the winter as they look for a warm place to nest. Pedestal controllers are an attractive location so take a portable vacuum cleaner with you to clean out any pedestal that has some new visitors. Plug any conduits that are providing an entry path with duct seal.
- **Communication tests** should be conducted to make sure all controllers are "online" and check to ensure that controller ID's are properly programmed into each faceplate and that communication cards are properly plugged in and functioning.



Controller check



Grounding verification

- **Grounding and surge protection** devices should be checked to ensure that controllers have the maximum protection against surge heading into the season. This service can be provided by your irrigation distributor or contractor.

Two-Wire systems require routine system maintenance. For instance:

- **Diagnostic tests** should be completed at the central control system. Conduct pass/fail tests, operational tests, check voltages and determine if the amp draw on each wire path is correct. If you are not familiar with all of the test procedures with a two-wire system, contact your distributor and schedule a service call for them to conduct a tutorial for you and your team.
- **Grounding and surge protection** devices should be checked. Because there are more grounding locations on a two-wire system, courses should contact their distributor or contractor to come in and test six holes every year to ensure that the grounding system is maintaining the level of protection required.

Pumping stations are often referred to as the "heart of the irrigation system." The pumping station must be well cared for so that it is ready to perform when needed.

Consider these points:

- **Pump Service Companies** can provide an extensive pre-season check of station components. Checking items like oil, grease, pump rotation, pump packing, and amp draw at the beginning of the year can help identify potential problems before the pump station is required to operate at full load. Give yourself time to complete any service items before the season begins.
- **Slowly fill the piping system** if the system was drained. An empty piping system on a typical 18-hole golf course can hold 25,000-30,000 gallons or more. When water is drained and replaced with air, there is a significant potential for damaging pipelines and fittings when air is evacuated as water fills the lines. If water is introduced too quickly, air can be compressed and when valves or sprinklers are activated, the air is quickly replaced with water that is coming behind it to fill the void. This is when water hammer occurs. A good rule of thumb is to introduce water at a rate of 1 foot per second or less which equates to no more than 150-300 GPM of flow for most irrigation systems. If you do not have a written procedure, contact your irrigation system designer or consultant for more information. Keep in mind, while you are filling the pipelines, air should be released through air release valves, drains, quick couplers and sprinkler heads. On most courses, the start-up process should take three or more crew members up to two days or more.
- **Alarms and safeties** should be checked to ensure they are working properly and ready to protect the pump station and irrigation system if needed.
- **Flow meter and flow logs** should be updated and prior year data should be recorded and stored. Check to ensure that the flow meter is properly calibrated. This is essential for pump station operation and to comply with flow reporting requirements.
- **Screens** should be checked and cleaned. Check the screen on the source intake as well as any screens on the pump station. Make sure they are properly cleaned and clear of debris.
- **Pressure maintenance pump** should be checked to see if it is working properly and not cycling too often. A good rule of thumb for most courses is the pressure maintenance pump should not cycle more than 3-6 times an hour when there is no irrigation running or system flow demand, although this can vary greatly due to the size and age of the irrigation system. If your pump station is cycling more than that then search for a leak(s) that may be causing the cycling.

Follow these procedures to help put your irrigation system in a position for success before the irrigation season begins. Develop a maintenance check list that you can follow throughout the year that includes daily/weekly/monthly checks of key components. Utilize your distributor, manufacturer and authorized pump service provider for technical support and contact an experienced irrigation system designer or consultant for help when needed.

Paul Roche and Matt Milucki are principals at Golf Water LLC, a golf course irrigation design and consulting firm in Wake Forest, North Carolina, and Atlanta, GA. Combined they have over 50 years of golf course irrigation experience in design, technical services, distribution and manufacturing.





New Year, New Noxious Weed List

Emilie Justen, Minnesota Department of Agriculture

Every three years, the Minnesota Department of Agriculture (MDA), with recommendations from the Noxious Weed Advisory Committee (NWAC), updates the state's Noxious Weed List. As the lead agency for noxious weed regulation, the MDA maintains the Noxious Weed List and helps local governments with enforcement of the Minnesota Noxious Weed Law.

A noxious weed is defined by the Minnesota Noxious Weed Law as an annual, biennial, or perennial plant that the Commissioner of Agriculture designates to be injurious to public health, the environment, public roads, crops, livestock, or other property.

The Noxious Weed Law regulates noxious weeds in four categories: Prohibited Eradicate, Prohibited Control, Restricted and Specially Regulated. Listed species go through a rigorous evaluation to determine their invasive potential, difficulty and cost of control, any benefits, and injury or harm they may cause to humans, livestock, property and the environment. Each species is considered for reevaluation every three years. With the exception of emergency listed species, the Noxious Weed List only changes every three years. Plant species can be petitioned for evaluation by NWAC. The outcome of the evaluation is a recommendation to the Commissioner of Agriculture, who then makes the final decision to list or not list the species.



An infestation of Winged burning bush (*Euonymus alatus*) in a native forest. Photo courtesy of MDA.

Prohibited Noxious Weeds cannot be sold, imported, propagated or transported in Minnesota and landowners must manage any of these species occurring on their properties based on one of two regulatory lists: Prohibited Eradicate and Prohibited Control.

- Prohibited Eradicate species are the state's highest priority noxious weeds. These species are known to exist at either very small populations in the state or are not known to be present in the state but are deemed to be a serious threat. Prohibited Eradicate species must have all above- and below-ground parts of the plant destroyed.
- Prohibited Control species exist in higher populations statewide than Eradicate species, and the most effective means of preventing their

spread is to prevent maturation and dispersal of any propagating parts.

Restricted Noxious Weeds are widely distributed in Minnesota. They are detrimental to human or animal health, the environment, public roads, crops or other property. Similar to Prohibited Noxious Weeds, they cannot be sold or propagated. However, if landowners have them on their properties, they are encouraged to manage these species but cannot be forced to do so under the Noxious Weed Law. During a reevaluation, a species on the Restricted list may be reclassified as a Prohibited Noxious Weed if effective means of control on a broad level are developed, such as biological control.

Specially Regulated Plants are native or have the potential to cause harm in non-managed landscapes. The species in this category have specific management plans or rules that define the use and management for the plants.

Right, Lonicera japonica, Japanese Honeysuckle has been added to the latest Minnesota Noxious Weed List. Photo courtesy of Bill Johnson.





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**Time for a virtual cup of coffee?
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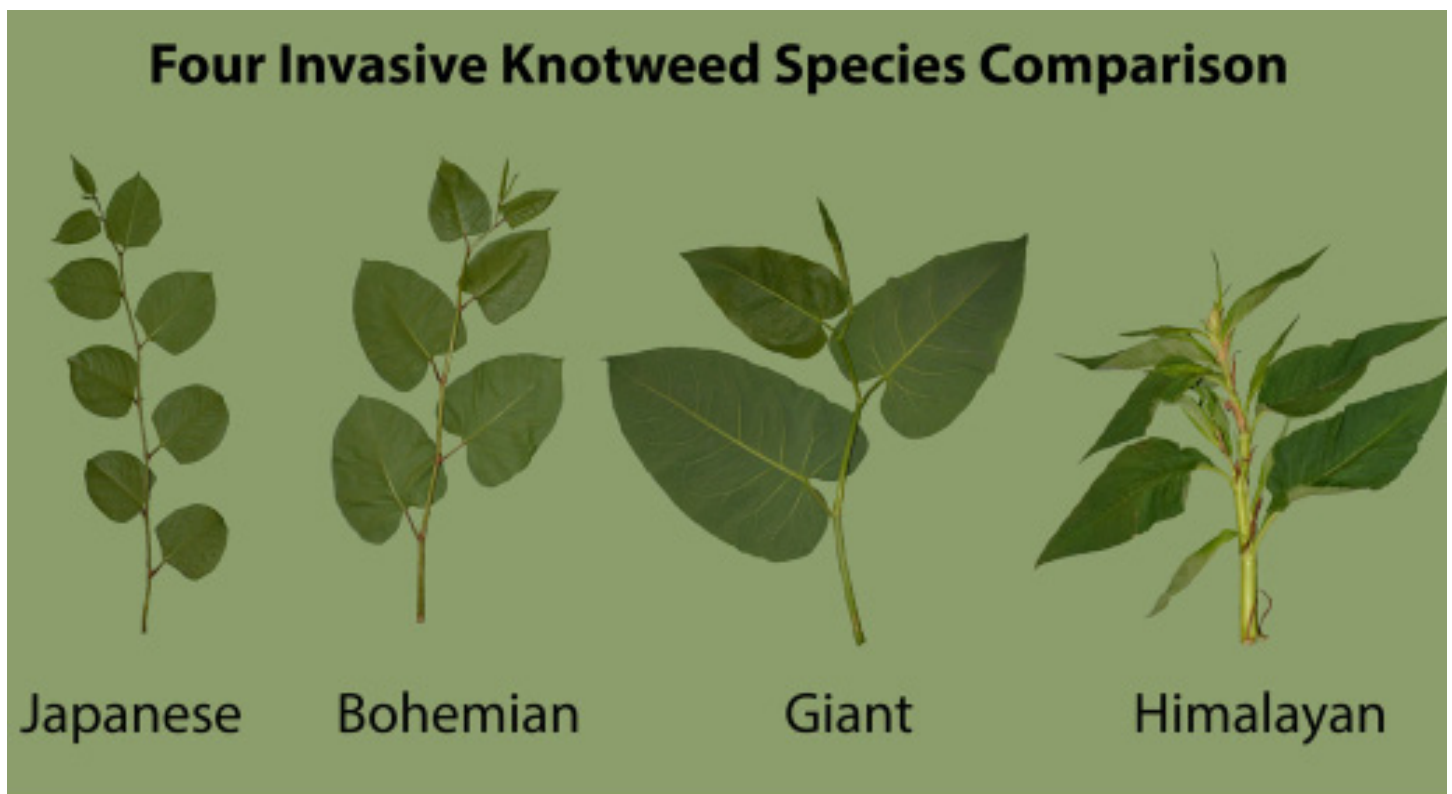
It wouldn't be the same

On January 17, 2020, the MDA made numerous changes to Noxious Weed List. A total of six new species were added to the list:

- Japanese honeysuckle (*Lonicera japonica*)
- Bohemian knotweed (*Polygonum x bohemicum*)
- Norway maple (*Acer platanoides*)
- Siberian peashrub (*Caragana arborescens*) (exemption for Green Spires® *Caragana* - *Caragana* 'Jefarb')
- European alder (*Alnus glutinosa*)
- Winged burning bush (*Euonymus alatus*).

Three species changed categories:

- Japanese knotweed (*Polygonum cuspidatum*) and giant knotweed (*P. sachalinense*) were moved from Specially Regulated to Prohibited Control
- Tree of heaven (*Ailanthus altissima*) from Restricted to Prohibited Eradicate



Do you know your knotweeds? These invasive species are overgrowing many native landscapes. Identification chart courtesy of Holy Nursery.

Japanese honeysuckle is designated Prohibited Eradicate. It is a woody vine with no known populations in Minnesota. It has been documented as invasive in other states and is a threat to forests, grasslands, and roadsides.



Tree of heaven was moved from Restricted to Prohibited Eradicate. Two populations have been documented in Minnesota and were eradicated. Tree of heaven is a preferred host of a destructive non-native insect called spotted lanternfly (*Lycorma delicatula*), which has been documented in multiple eastern states.

Once a coveted nursery plant, now the Siberian peashrub (*Caragana arborescens*) has landed upon the Noxious Weed List. Photo courtesy of Handy Andy's Nursery

Three species were designated Prohibited Control: Japanese knotweed, giant knotweed, and bohemian knotweed. Many populations of knotweed species have been documented in the eastern part of the state, particularly in Duluth and the southeast. Knotweeds have also been documented growing through building foundations, causing property damage. With increased scouting, mapping, and refined management plans, the move from Specially Regulated to Prohibited Control means communities with knotweed populations can devote more resources to controlling it.

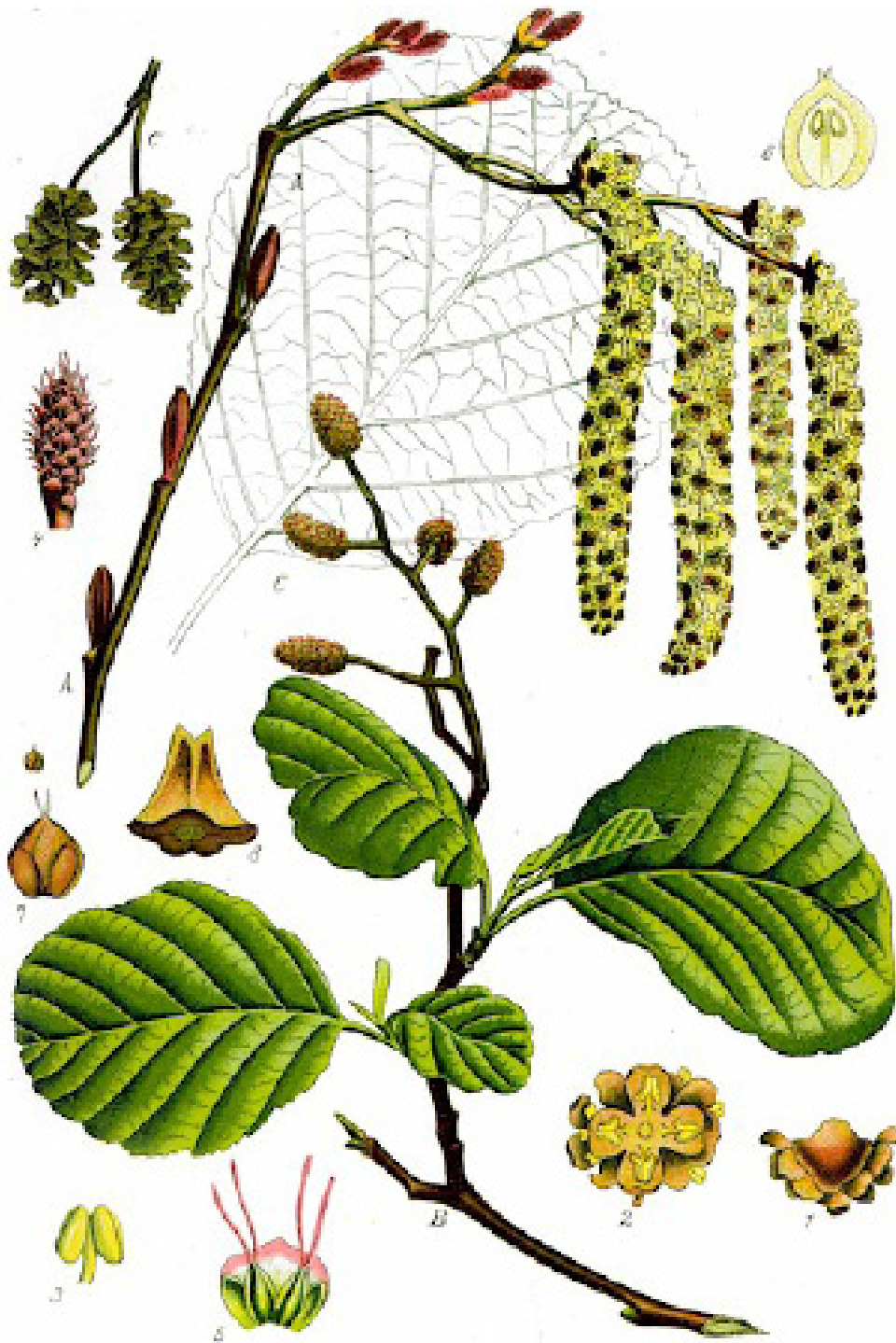
Two species were added to the Restricted list: Siberian peashrub and European alder. Siberian peashrub is a USDA Zone 2 hardy species that has been used in windbreaks and shelterbelts. Though the species is prohibited from sale, importation, propagation and transportation, an excep-

tion was made for Green Spires® Caragana - Caragana 'Jefarb', which is a hybrid of Caragana arborescens and C. frutex and believed to be sterile. European alder has been documented as invasive in many eastern states and is a prolific seed producer. Though it is not widely planted in Minnesota, its current extent is not well understood.

Finally, two species were added to the Specially Regulated category: Norway maple and winged burning bush. Norway maple has been documented as invasive in many eastern states and has been widely planted as a boulevard and landscape plant. Norway maple's special regulation is the following: Sellers affix a label that advises, "Norway maple should only be planted in areas where the seedlings will be controlled or eradicated by mowing or other means. Norway maple seed is wind dispersed so trees should



New on “the list” is the Norway Maple (Acer platanoides), because of its prolific seeding and self-propagation. Picture courtesy of Halla Nursery.



Left, the European alder (Alnus glutinosa), has been documented as invasive in many eastern states and is a prolific seed producer. Photo courtesy of The Wood Database.

not be planted closer than 100 yards from natural areas.” Winged burning bush is also a widely planted landscape plant but has been naturalizing in wooded areas and parks from the Metro to southeast Minnesota. Winged burning bush’s special regulation is a three-year nursery production phase-out before moving to the Restricted list January 1, 2023.

To view the updated Noxious Weed List and to learn more about the category definitions, please visit www.mda.state.mn.us/noxiousweedlist.

Meet the MGCSA

Fred Taylor, CGCS Mankato Golf Club

Interview by Joe Berggren

Public or Private: Private

Number of Holes: 18

Fulltime employees: 3

Seasonal employees (not including full time): 12

Number of employees of entire facility at peak season:
55

Types of grass: Bent/Poa: Greens, Tees, and Fairways

Total course acreage: 120 acres

Greens acreage: 2.4 acres

Tee acreage: 2.2 acres

Fairway acreage: 20 acres

Rough acreage: 68 acres

Driving range acreage: 3.5 acres

Range tee acreage: .3 acres (~13,000ft²)



Professional Facts with Fred

How many years have you been in your current position? 28 years

How many years have you been in the turf industry? 43 years

Where else have you worked? Ironwood Golf Club, Mankato

Turf School Attended (if any)? University of Minnesota – Waseca and Mankato State University.

Industry thoughts

What is one "master plan" thing you would like to change at your golf course? Institute a master drainage plan that would include retention ponds.

What concerns do you have the turf business and the future of golf? Increased player demands colliding with environmental concerns. Golf may also need to adapt to a lower time commitment such as 6 hole loops.

What is needed to bring more young professionals into the industry? The industry will need to scream, "SHORTAGE", very loudly and increase wage and benefit packages. The industrial trades are sounding a muffled scream right now for the same reasons.

What piece of equipment do you want? Not a need, a want. A "Tree Gobbler". A piece of equipment that automatically fells, limbs, and mulches a tree in a single motion. All that is left is the stump hole!

In terms of industry costs (equipment, pesticides, labor, etc.) are they too low, too high or just right? The high price of new equipment is always a topic of discussion among superintendents and members. A new rough mower costing more than a BMW is both bewildering and frustrating. On the other hand, the prices of pesticides seem acceptable since the onslaught of post-patent products that have entered the market. One could argue that the competition among *many* players in the chemical market place reduces prices, while very *few* equipment manufactures leads to comparatively higher pricing in that market. To be fair to the manufacturers, however, they seem to always fill our needs with new technology, increased efficiencies, and improved playing surfaces.

In terms of labor, there is a definite shortage of hourly workers in most areas of Minnesota, creating a higher wage base. Additionally, I find fewer young people willing to work the early morning hours and perform physical labor when, alternatively, they can make more money folding sweaters, or serving cocktails and chicken wings --after sleeping until noon.

FUN FACTS with Fred

Have you ever met a celebrity? Who? Hall of famer Yankee Yogi Berra and volleyball legend Karch Kiraly. Also, members of ZZ Top and Little Feat. Oh, and '60's singer/songwriter Ricky Nelson.

What is your favorite vacation spot? Hawaii's Big Island. Five climates on one island!

What is your favorite memory of starting your turf career? Jeff Markow and I balancing leaf rakes on our foreheads when we were supposed to be raking debris at Ironwood Golf Course.

Little did we know that people were watching us from their backyards adjacent to the course. Yes, it was unprofessional and embarrassing, but we still laugh about it 40 some years later!

What is your favorite job on the golf course? Walk mowing greens. It's still a great way to start the day! Unfortunately we now triplex most days to save labor.

What is your least favorite job on the golf course? Confronting golfers when they do stupid stuff. There is no end to it.

Have you played any famous golf courses? Which ones? I didn't play Cypress Point, but I was lucky enough to get a tour of the course with Jeff Markow. Hallowed grounds!

Who is in your dream foursome? Hugh McCutcheon, Rod Wilde, and Karch Kiraly. A lot of volleyball and a little golf.





UW-MADISON TURFGRASS SCIENCE

ENTOMOLOGY * GENETICS * HORTICULTURE * PLANT PATHOLOGY * SOIL SCIENCE



The certificate courses are offered over two 8-week periods, early-October through mid-December, and mid-January through mid-March. This timing works well for prospective students who already work in the turf industry and want to augment their work experience with a world class education. It also allows those in the two-year program to participate in an extended internship program (late March – October).



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The two-year certificate curriculum offers courses in introductory soil science and turfgrass management with a focus on communications, human resources, and the business side of the industry in year one, and specialized courses in turfgrass management in year two. The two-year certificate courses follow the same time frame as the one-year certificate courses. Recent high school graduates should pursue the two-year certificate instead of the one-year option.



ACCESS TO TURF RESEARCH CENTER



Four-year college students receive a strong background in the social, mathematical, communication, physical and biological sciences. This is the foundation which students use to progress to advanced courses related to turfgrass management. The graduate has a variety of options for employment and professional certification, provides increased flexibility to change careers or to pursue advanced degrees and further expand employment opportunities and career advancement.



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In Bounds

by Jack MacKenzie, CGCS

Well this has certainly been a weird year! Just follow the bouncing ball.

Early in the 'annual' cycle and due to limited registrations to attend the Outreach and Education Turf Forum Series, the Board changed direction and put the programming on the shelf for a while. The new focus for outreach and networking opportunities was to have been more semi-spontaneous, informal gatherings and several family events, both in and out of the metropolitan area.



Dates and costs were being investigated for Loon's, Saint's and Twin's games, axe throwing competitions, the renewal of sporting clay tournaments and regional "coffee breaks" where members could drop in for a cup of "joe" and chat. The MEGA was being pared back and combined with the Winfield Golf-Centric Pesticide Recertification program, thus eliminating a day in the busy educational off-season. All of these changes came about because the Board appreciated the value of time for work, time for education and time for family.

KAPOW!!!! Days after the Minnesota Golf Industry Day On The Hill our seemingly tight schedule was disrupted by new mandates, "stay at home", maintenance only and, finally, courses were open for play. Fortunately, the DOH timing was right for leveraging our relationships to achieve solid support for the initiation and continuance of golf as a viable socially distanced recreation. Those of you who reached out to your legislators de-

serve much of the credit for keeping the golf momentum going. On behalf of our industry, your industry, thank you.

Unlike the imploded calendar of social and educational association events, the legislative session continued. One issue of great importance to our industry has been the employment of 16 and 17-year-old youth who would be allowed to operate turf maintenance equipment on golf courses. Last year Tom Blank, Superintendent at Lake Miliona Golf Course, carried the ball and provided testimony on behalf of the industry. Unfortunately, the House interest was limited, and the Bill did not pass through Committee.

This year, with renewed energy and legislative interest in passing the “Lawn mower” Bill, Brady Scott, Superintendent at Minnewaska Golf Club, gave pre and post CV-19 testimony supporting the employment of 16 and 17-year-olds. The former in-person, and the later via videoconferencing. The Senate Bill passed, and the House discussions are on-going, but one thing is for certain, the conversation created through telecommunication was a whole lot easier physically due to an incredible decrease in time and travel commitments. This is the future. A not-so-new format for easy, focused, no-travel and convenient discourse, videoconferences are now the rule of the day.

On April 23rd, your MGCSA Board held a Go-To meeting with all Directors present and accounted for, a rarity in this fast paced and time critical industry. It was almost ‘too easy’ to conduct an industry and business meeting in less than an hour. Our regularly scheduled quarterly Board Meeting will be conducted in the same format. Distance conferencing will likely become the norm as the Directors business addresses range from

Rochester to Morton to Duluth and everyone is required to, yet again, do more with less on their properties.

So successful was the on-line gathering, that virtual coffee breaks, on Tuesdays from 10:00 until 11:00 in the morning, have been created. If it becomes popular it will provide a destination for like minded professionals to have distance conversations about issues impacting their work lives. It is hoped that once the new University of Minnesota Extension Turf Specialist is retained, he or she will be an active participant and able to answer member inquiries.

Will we get back to pre-covid normal? Nope, too much disruption has taken place for the world we previously lived in to be duplicated. It doesn't take a Tarot Card Reader to tell the future of decreased/limited social opportunities and increased video communications.

The MGCSA Motto of Advocacy, Education and Research will need support to maintain relevance.

In my mind's eye I envision advocacy becoming more important than ever. Post-covid agency and legislative decisions have been very fast paced and, of great concern to me, done with limited industry input. It was a surprise to see our operational allowances came from the Department of Natural Resources. Even liquor rulings are directed through the DNR. The leadership role seemed weird to me, but it must have made sense to somebody in the administration. Regardless of what agency holds our reins, the MGCSA must be present and diligent in support of causes that impact golf course maintenance.

Research, or at least the direction of and generation of funds for Research, will continue to be of great importance to the MGCSA. As mentioned earlier, there will be a new Extension Turf Scientist hired and there is a possibility that Dr. Brian Horgan's vacated position will be filled. Will the Association have the monies or ability to generate support dollars in the post-covid paradigm? Could cutbacks at the UMN alter the college's value of the TROE Center? Are we prepared as an industry to counter this potential obstacle?

Education, and member engagement, is an enigma. How many participants, for what cost and at what size of a venue to provide social distancing can be sustained by our members? Will instructors be willing to travel? At what cost? Could the new educational format be on-line? Could this protocol be the new format that would allow the Association broader access to even better presenters at a price break that would support UMN Research and still be low enough for tremendous participation?

Hmmm...

Follow the bouncing ball!

