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Host Eric Peterson**

July 21

**The Championship
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Host Nick Folk**

October 13

**The Wee One
Brackett's Crossing Country Club
Host Tom Proscheck**



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Hole Notes (ISSN 108-27994) is digitally published monthly except bimonthly in November/December and January/February by the Minnesota Golf Course Superintendents' Association, 10050 204th Street North, Forest Lake, MN 55025. Jack MacKenzie CGCS publisher. Please send any address changes, articles for publication, advertising and concerns to jack@mgcsa.org.



Presidential Perspective

by Roger Stewart, CGCS Superintendent at TPC Twin Cities

Yes, it has been a long, cold, snowy winter, but it has been a very busy winter for MGCSA. The committee assignments have been made for 2014 and board members have been busy planning for the coming year. The Education Committee is deep into planning for the 2015 Green Expo and Mega Seminar. The Research Committee has been working on the Membership Driven Research for 2014, Rounds for Research and the Gun Raffle fund raisers. The newly formed Finance Committee is meeting to discuss the 2014 budget and update the current SOP, now that we have combined the Secretary and Treasurer's positions. The Environmental Committee has met several times with regulators discussing the concept of an environmental certification program for golf courses that could lead to considerations in the event of water shortages and restrictions. The Membership Committee has been working on outreach opportunities

for Equipment Managers and outstate members. All of these initiatives would not be as successful without the energy and commitment of our Executive Director, Jack Mackenzie. Between the outreach events, meeting with regulators, representing MGCSA at focus groups, for everything from groundwater issues to pollinator issues and more, Jack is a very busy person. All of these things move our association forward on a daily basis serving our membership.

One of the many interesting opportunities that Jack MacKenzie has been working on is representing our profession in meetings with individuals concerning the plight of pollinators in our state. Yes, that's right, the bee people. I have always been fascinated with the art and science of beekeeping. Like so many people, I have until recently sort of taken bees for granted. With the recent problems caused by the colony collapse phenomenon and the subsequent scrutiny that neonicotinoids have come under, bees and beekeeping are gaining the

attention of the public, regulators, legislators, and of course the media. The fact that our Executive Director has been engaging the collective bee community in conversation has led to some interesting discussion about the positive role golf courses can play in providing habitat for pollinators. I don't know if we have any definite outcomes to talk about at this time, but the possibilities are there and MGCSA is positioned well to provide its members with opportunities to be a part of the solution to this growing concern across our state.

In my last President's Message, I mentioned that one of the initiatives that I feel is most important is engaging our members to participate in their association at the highest level they can. A participating and engaged membership is one of the most important components of a healthy and viable association like MGCSA. If you have recently been approached by a member of the Board of Directors, Committee Chairman or Committee member to serve on a committee, please consider the opportunity to work for your association and learn more about our goals and how we work

to achieve them. I guarantee you the commitment is minimal but the rewards are great. It has been proven time and time again that the more members we engage through the committee system, the more ideas that will be generated and the more connected the Board of Directors and our management will be with our membership. Committee service is so rewarding for those who participate and it is a great avenue to give something back to your association and your profession. Please consider picking up the phone or send an email to any board member or committee member and let us know you are interested in participating in a vital part of your association and they will get you started.

The snow will be a distant memory soon and our season will be ramping up quickly no doubt. Before you get too busy, please give some consideration to volunteering and serving your profession and MGCSA. In the meantime we will continue to work on behalf of our membership to advance the profession and MGCSA. I wish all our members a great start to the 2014 season!

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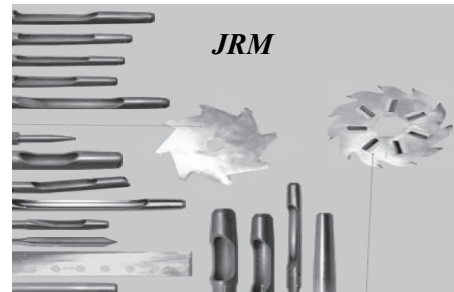
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In Bounds

by Jack MacKenzie, CGCS

“You’re dead!” I exclaimed with glee, releasing the

trigger and looking for another victim. It was late in the day and I had about twenty minutes left in my tank. For eight hours, I had been selecting my prey and had finally succumbed to the exhaustion only felt after dragging hundreds of feet of ½ inch hose in the sweltering heat.

Earlier on I had my handgun smoothly applying a three-way herbicide over large areas of property. Now, tired, I was force-feeding individual plants a toxic over-dose of poison nectar. One by one, the bright yellow weeds were sent to the land of epinastic fits. “You’re dead!”

In hind sight, my aim was perhaps too good, for over time the harbingers of spring were slowly eradicated from the White Bear Yacht Club, then Austin Country Club, The Lost Spur and other clubs I worked at. Not unlike the 13-stripe ground squirrel, dandelions had met their match and were being eradicated from golf courses.

Flash-forward to today; I suddenly have a strong compassion for the colorful spring flower. As your representative upon the Garden and Landscape Pollinator work group, I have learned a lot about the plight of our pollinating insects, without which our food supply could be in jeopardy. Our first meeting, held earlier this month, brought together concerned citizens, beekeepers, park and city managers, nursery growers and the golf course industry. Our mission is to create a reasonable approach to enhancing our bee and pollinator population.

The issue is more than just pesticides, although insecticides surely have an impact. It is more than natural predators such as mites and fungi. The problem includes genetically modified crops, vast and humungous tracks of monoculture vegetables that flower once each year for a short time and, surprisingly to me, the elimination of the lowly dandelion. Even if all the chemistries were taken off the market, we would still have a huge habitat issue.

Why dandelions you ask? Well,



what is the first flower to bloom in the spring? What is the earliest nuisance weed you witness pop up along the curbside or south facing slopes? What is the first food source for our pollinators?

Think about this. Each spring hibernating native honeybees, wasps and other insects break their winter dormancy and search for food. At one time there was an infinite amount of dandelion to provide this population of beneficial creatures a food source for the first two weeks of their foraging. Today, our dandelion populations are dwindling, and in turn our bees are starving to death.

Planting summer flowers isn't going to cut it when your bees have starved weeks earlier. Crabapples are a crapshoot and most flower too late to balance out for the loss of early spring pollinating flowers...even if they are considered weeds.

In my studies I have learned that in our thoroughness to keep properties clean and weed free we have had an impact upon the bee and pollinator population. The challenge isn't about creating more bee colonies, although the Bee Squad from the UMN have set up camp at Town and Country Club and Somerset, it is all about providing every

pollinator a food source throughout the spring, summer and into the fall.

What can golf do about the issue? Consider some tolerance for the pretty yellow flowers so often damned for their three-week burst of pre-peak season color and which prompt the charging of the sprayer with its 20 foot boom. No, not wall-to-wall primrose, rather buffer strips well out of play where the dandelions are allowed to grow with no mowing until after they have bloomed. Even the most retentive green grass purest could give up a small piece of their 150-acre playground to enhance the habitat for our pollinators.

Could golf make a difference? Ponder this equation: 500 golf destinations allow five 20 foot wide by 600 foot long sections of their course go "to yellow" each spring would create almost 700 acres, spread across the state, of prime pollinator forage. Would you consider that making a difference? I sure would!

Players love the blue bird trails, bat and wood duck houses, mallard hen tubes and bird feeders placed upon their course. Why not a section for bee habitat too? It is such a small thing to ask for such an incredible employee, our worker bees.

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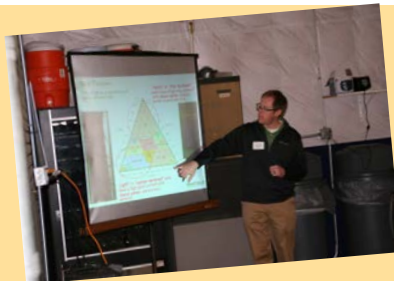
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Taking Your Pulse; Maintaining the Heart of Your Golf

By E. Paul Eckl



In previous articles we have looked at the underground sections of the irrigation system and the things that influence the performance of those parts. In this article we will be looking the control system. If the pump station is the heart and the pipe and sprinklers are the body, the control system is the brains of the operation.

As with the other parts of the system, there are many different types and levels of control out in the field in our area. All of these systems can work well if the operator knows how

they work and takes the time to maximize the efficiencies. Let's start with a description of the control types.

Quick Couplers:

When attached to an impact sprinkler, these were the first advancement from pulling hoses to specific areas. This type of a system requires a person installing the Quick Coupler into the system and timing how long it is at a specific spot. It also requires the operator to know how many sprinklers can be operated at a specific time without overtaxing the piping system.



Many of these types of systems have a “night water man” who operates the system throughout the night.



Electromechanical clocks:

These were the first attempts to automate the irrigation system. Clocks, much like the ones used to turn on Christmas tree lighting, are connected to the valves in the ground to turn on the sprinkler at a predetermined time. These systems eliminate the labor of actually turning on the individual sprinklers. The systems initially did not



photo: Rainbird online

have any type of central control and were operated as a number of individual stand alone units.

This required the Superintendent to manage the system water flow through calculations and knowledge of how many and of what type of heads could be operated at a time. Central control eliminated the need for the Superintendent to go to each location for programming, but still requires the operator to know how many

and which type of sprinklers can be operated at a time. These systems are quite reliable and really are only subject to failure through power outages and wear over time.

Solid State Control:

The next evolution required the field controllers to move into the solid state era. This put a computer chip into the field boxes. This was a transitional stage for the industry as they technology advanced. With solid state field controls the systems would eventually be able to be moved to electronic control from other locations. The controllers would then be able act in either a stand alone or central control configuration. This meant that each field box could hold a number of pro-



photo: Rainbird online

grams and operate independently.



photo: Toro online

Computer Control:

Originally these first computers were used to replace the electro-mechanical central control, while the clocks in the field remained. This gave the system the ability to start to think about flow control. Granted these early systems were large, expensive and honestly just fancy starters. Eventually the field clocks were also computerized so that communication between the central and the field became more effective and efficient.

Today's systems have the ability to not only start and stop the sprinklers, but determine which heads should come on and when, to maximize the flow capacity of the system. Additionally, as the software became more and more advanced, things like ET, soil moisture and other factors

began to be figured into the equations used by the system to more fully automate the irrigation cycles.

Goals of Control

As control systems evolve they become not only more complicated but easier to use. This would seem like an oxymoron, but it is not. As I alluded to above, the first systems provided a computer controlled switch to turn things on and off. As large computers turned to personal computers the user interface became more of an issue. Manufacturers need the user to be able to easily do what they wanted to do. These systems continue to evolve today and manufacturers

continually try to make it easier for the user.

In the background of the software operation, however, the systems get ever more complicated. As I mentioned the first ones were a fancy switch. The latest software is able to consider so many factors that it seems almost incomprehensible. For example some of the factors that now are able to be factored into the software are pipe system sizing and the actual piping tree; soil types, head type, nozzle size, spacing, ET, soil moisture data, weather station data, pump station data and much more. The goal of all of this data is to more ac-

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curately put the water where it is supposed to go and in the quantity that is needed. Along with that the systems are designed to maximize the system without breaking it. By this I mean that the computer is trying to match the pipe size and piping tree to turn on as many heads as the pipe will allow without affecting head performance. While it is doing this it is also trying to maximize the pump station output so that the pumps do not cycle on and off, thus shortening the motor life and using more electricity. All of this is taking place within the software to maximize efficiency, shorten the irrigation cycle and put down the proper water in the proper place.

The problem with these systems is the same as with all computers: garbage in, garbage out. All of the new computer systems are designed to operate with some efficiency with minimal data input. While certainly better than anything achievable without central control, there is so much more can be done if a person is willing to take

the time to input all of the data the system can handle to give you the best control, and efficiency. Programming of new systems is getting easier all of the time, but filling in spreadsheet after spreadsheet can be a long and boring proposition, best done with a clear head and lots of caffeine available.

Even though many people feel that these systems will eventually be able to run themselves that seems unlikely. In the end, turf systems are a living and respirating thing, that will always require a human hand to oversee the machines.

E. Paul Eckholm, CGCS, is a former golf course superintendent with over 25 years of experience in golf course management and is currently an irrigation specialist at Yamaha Golf and Utility. Paul has been working with numerous manufacturers of irrigation products for the past 15 years on product development related to water use reductions. Paul currently holds a number of certifications in irrigation technologies.



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Four Things You Should Know Affordable Care Act

By Patrick McGuiness, Esquire

The ACA is an extremely complex piece of legislation, and many of the administrative rules are still being drafted. The following is an overview of important facts about the ACA, and how it will generally function. Every business is unique and has their own set of circumstances, so it is important to seek qualified assistance in determining how the ACA will affect your business.

1. Businesses with 50 or more Full Time Equivalent Employees are Considered 'Large Employers' and Must Offer Health Care to Employees or Pay Penalties.

Generally speaking, large employers must provide health coverage to their employees. If a business has 50 or more FTE employees then coverage must be provided or penalties must be paid. Calculating if an employee is FTE requires a look back at their hours for the previous year. If the employee

averaged more than 30 hours per week, then they are considered FTE. Alternatively, if an employee averages more than 130 hours in a calendar month (even if it isn't 30+ hours per week), they will be considered a FTE.

In order to calculate how your part time employees factor into the FTE count, you must do the following equation. Add together all of the hours worked by part time employees in the past calendar year. Divide that number by 12 to get the average total number of part time hours per month. Then, take that average and divide it by 120. The result is the number of FTEs that your part time employees must be counted as. For example:

If you have 20 part time employees whose total hours in the last calendar year was 21,600 hours;

$21,600/12 = 1800$ total average hours per month

How About the

$1800/120 = 14.5$ FTE

Adding your part-time workers' FTE total to your regular FTE workers will get the total FTEs for determining whether your business is a large employer and must comply with the ACA.

If you have determined that your business is a large employer, what must you do?

Large employers must offer health care coverage to full time employees and their dependents. Once again, full time means any employee who averages more than 30 hours worked per week, or more than 130 hours each calendar month. Dependents are defined by the regulation to be the full time employees' children that have not reached the age of 26

What type of health coverage must be offered?

In short, the health plan offered by large employers must meet the ACA's minimum value standard.

This means that the employer's plan must pay for at least 60% of the total allowed costs of the plan. When looking at health care plans, this is a very low threshold and working with a good health care insurance agent can help you make sure your business is in compliance. It is also important to note that the large employer's health offers meet the affordability standards set by the ACA. To meet this standard, the cost of the employer's individual coverage plan cannot be more than 9.5% of the full time employee's total household income.

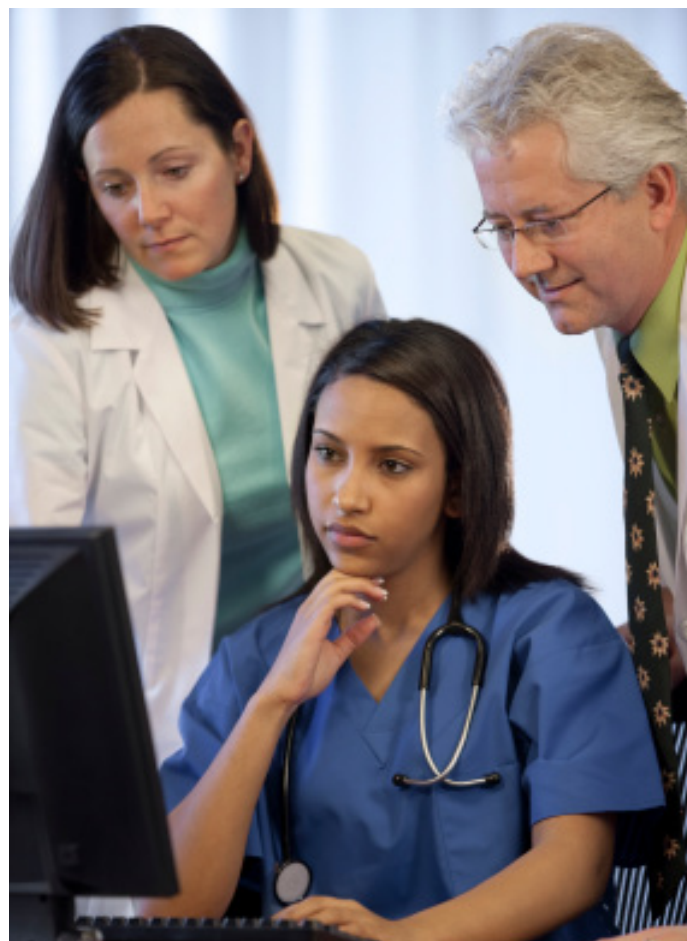
What if the business doesn't offer health coverage?

Once a business has determined that they are a large employer for ACA purposes, they must determine if they would rather provide coverage and meet compliance standards, or decide not to offer health coverage and pay the associated fines. There are many web-based calculators available to assist business owners with determining a course of action on this. It is best to speak with your accountant, attorney, and human resources person in making these types of decisions.

If you determine that you are a large employer, there are many other compliance issues which a business should take into consideration as the ACA goes into effect. Work closely with your business advisors to make sure your business is prepared for implementation and enforcement of the ACA.

2. There is an Exception for Seasonal Businesses – Figure Out if You Qualify.

If your business is seasonal in nature, and most green industry businesses are in one way or



another, then make sure you understand the exception which exists as a part of the ACA for seasonal businesses. As previously discussed, the number of FTEs a business has is the key to determining how the ACA applies to a business. Fortunately, congress created an exception of sorts for seasonal business to use when counting FTEs.

If a business that would otherwise be considered a large employer, exceeds 50 FTE employees for not more than 120 days or 4 calendar months, then the business may qualify for the seasonal worker exception. If your business has 40 full time employees for 8 months of the year, and 85 full time employees during 4 months of the busy season, then the business will not be required to offer health care to full time employees, even though the FTE calculation would otherwise result in more than 50 FTEs.

The term ‘seasonal employee’ has not been specifically defined by the Treasury Department for the purposes of the ACA, but they have stated that employers



can use a “reasonable, good-faith interpretation of the statutory definition” until further guidance is given.

Another important note with the seasonal worker exception is that the 4 months in which the business exceeds 50 FTEs do not have to be consecutive. It can be every other month or 8 months, or any combination as long as the business does not have more than 50 FTE employees for more than 4 months total in a calendar year.

3. Individuals Must Still Get Insurance Even if Their Employer Isn't Required to Cover Them.

If you have determined that your business is not a large employer, and is in no danger of being considered one even at the busiest times of year, then you may be wondering what your responsibilities are as a business owner and as an individual. As a business owner, even if your business is not required to offer a health plan, you still have regulatory responsibilities. As of October 1st, 2013 you are required to post a notice for employees which discusses the ACA and health care options available. A sample notice can be found on the Department of Labor's website or by conducting a simple web search.

Beginning in 2014, individuals will be required to obtain health insurance. This can be done a number of ways, including through enrollment in government programs such as Medicare, Tricare, or the Children's Health Insurance Program (CHIP). Individuals can also meet the requirement by purchasing insurance from their employer, or from their state's insurance marketplace (formerly called exchanges).



Failure to find the 'minimum essential coverage' will subject an individual to a penalty/tax. This will be enforced via tax filings, and for the first few years, the tax for not having insurance will be relatively small. There are also a number of exceptions to the requirement that

individuals purchase insurance such as the exemption for individuals who cannot afford coverage, and the exemption for taxpayers with income below the filing threshold. There are also exemptions for certain religious groups, and for small gaps in coverage. www.healthcare.gov is a good resource for finding out more about the exemptions and the ACA in general.

4. Use the Marketplace to Find Coverage.

Insurance marketplaces are one of the main features of the ACA, and are designed to make health insurance available to more people. The ACA required that each state set up a health insurance marketplace, or allow the federal government to set one up if the state was unwilling to do so. These marketplaces allow individuals to see what health insurance options are available to them, and at what cost.

The marketplaces offer insurance in 5 categories: Bronze, Silver, Gold, Platinum, and Catastrophic. Once the ACA has been fully phased in, the maximum penalty/tax for an individual who elects

Important Dates to Remember

There are quite a few dates to know as the ACA is implemented. Here are some of the most important dates to know.

2014:

January 1st: Individual mandate. Most individuals are required to obtain health insurance coverage through their employers, marketplaces, Medicare, or elsewhere. Failure to obtain insurance will result in a tax penalty. For 2014, the tax penalty is \$95 for an individual or 1 percent of gross income, whichever is higher. January 1st: Marketplace coverage begins. Marketplaces must be up and running and able to provide coverage in all states.

2015:

January 1st: Businesses deemed 'large employers' with 50 FTE or more are required to offer coverage to all FTE employees or face penalties. This date was originally January 1st, 2014 but was pushed back due to implementation challenges.

not to purchase health insurance will be equal to the cost of a bronze level marketplace plan. The marketplaces opened for shopping at the beginning of October, 2013. Coverage for insurance purchased through the marketplaces will begin as early as January 1st, 2014 with the open enrollment period ending on March 31st, 2014. Each state has a marketplace that is either state or federally run. www.healthcare.gov is a good resource to find out what your state is offering.

While there are a variety of options in the marketplace, the plans being offered are required to cover 'essential health benefits' to at least some degree. These benefits include: Ambulatory patient services, Emergency services, Hospitalization, Maternity and newborn care, Mental health and substance abuse care, Prescription drugs, Rehabilitative services and devices, Laboratory services, Preventative and wellness service and Pediatric services.

What it All Means:

The ACA is a complex law that will have an effect on you or

your business. Make sure you are following what changes you need to make and when you need to make them. There are many online resources available, and it is always a good idea to obtain outside assistance if you have any questions.

This article provides general information on employment law matters and should not be relied upon as legal advice. A qualified attorney must analyze all relevant facts and apply the applicable law to any matter before legal advice can be given.

Patrick McGuinness is one of the founding partners of Zlmen & McGuinness, Attorneys at Law. His law practice focuses on assisting contractors & other small business owners with a variety of employment law matters. He can be reached at pmcguinness@zmattorneys.com If you would like more information regarding employment law or other legal matters, please contact Zlmen & McGuinness, Attorneys at Law at 651-206-3203 or www.zmattorneys.com

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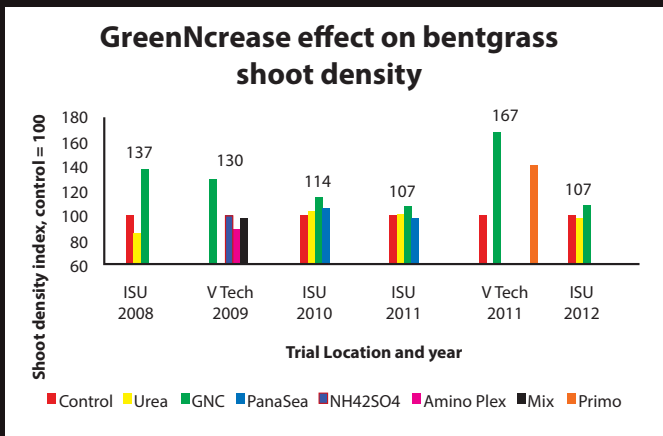
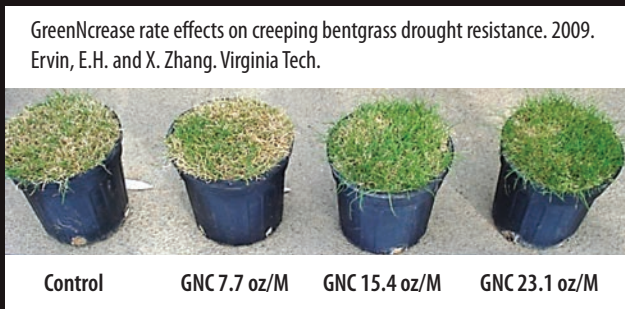
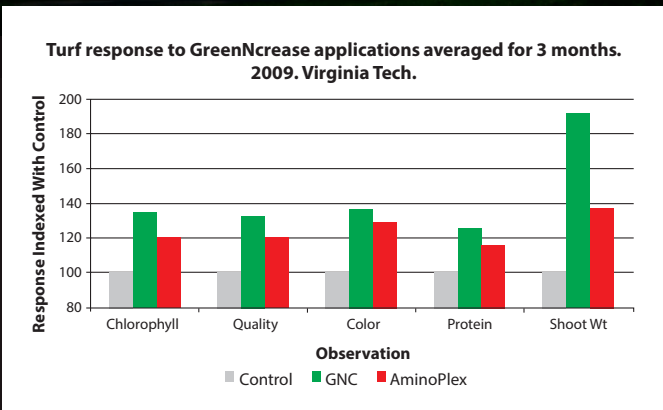
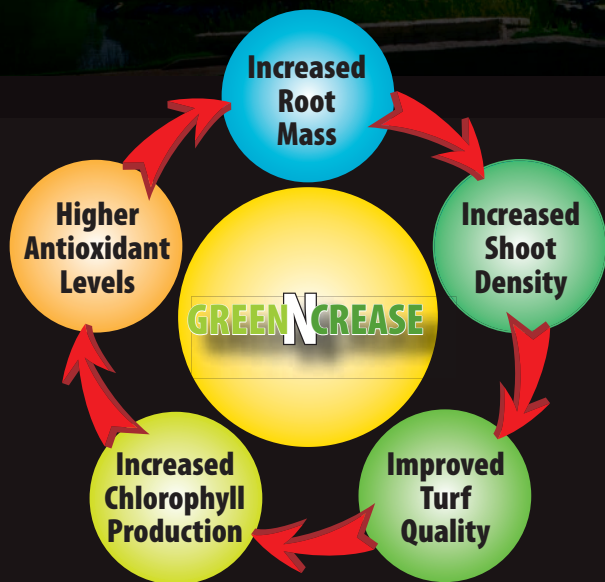
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Cold Hardiness of Emerald Ash Borer, *AGRILUS PLANIPENNIS*: *A New Perspective*

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Abstract

This study was designed to assess the cold hardiness of emerald ash borer larvae, the overwintering stage of the insect. We began by measuring larval supercooling points, the temperatures at which larvae freeze. We found that larvae collected from naturally infested trees in St. Paul, MN between late October and early December had an average supercooling point of -25°C (-13°F). Research elsewhere indicates that when these insects freeze, they die. Our laboratory assessments of cold hardiness were confirmed during field tests. Naturally infested logs were held outdoors in St. Paul, MN (low winter air temp= -28°C) and near Grand Rapids, MN (-34°C) for ca. 5.5 weeks. Approximately 40% of larvae from logs in St. Paul were inactive or brown, both evidence of death; approximately 90% of larvae from logs near Grand Rapids were inactive or brown, compared with the approximately 10% that showed evidence of death prior to exposure or after being held under cool, non-lethal conditions. Overwintering mortality may help to minimize the damage caused by emerald ash borer in areas with extremely cold winter climates.

Emerald ash borer, *Agrilus planipennis* Fairmaire was detected in North America initially in 2002. It was detected for the first time in Wisconsin in 2008 and in Minnesota in 2009. The insect is now poised to move into some of the coldest regions of North America, especially northern Wisconsin, northern Minnesota, and North Dakota. Cold stress has proven to

be a significant constraint during invasions by other species. Although regions where emerald ash borer has been found in North America could be considered “cold,” with an average low January temperature between -29 to -18°C (-20 to 0°F), colder regions have an average low January temperature frequently between -40 to -34.5°C (-40 to -30°F). The potential for emerald ash borer to survive and cause damage under these extreme conditions is not known.

Previous work suggests emerald ash borer will typically overwinter as a pre-pupa. Earlier instars may also overwinter, perhaps as part of a 2-year lifecycle. Prepupae will overwinter in a pupal cell commonly formed in the outer sapwood, but other life stages may be found in the phloem or bark.

Much of our current understanding of the cold tolerance of emerald ash borer is inferred from the presumed distribution of the insect in Asia, not careful observations of the insect. Preliminary reports on the cold hardiness of the insect in Ontario suggest that cold causes very little mortality until the insect actually freezes (Sobek et al. 2009). The temperature at which an insect freezes is known as its supercooling point. Sobek et al. (2009) indicate that the average supercooling point of emerald ash borer larvae recovered from Ontario was -30.6°C (-23°F). However, Wu et al. (2007) suggest that the supercooling point of larvae from China falls between -26.4 to -23.0°C (-15.5 to -9.4°F).

The objectives for our study were to measure supercooling points for emerald ash borer larvae recovered from naturally-infested green ash (*Fraxinus pennsylvanica*) in St. Paul, MN. We then developed an equation to relate the predicted extent of mortality to the lowest temperature experi-

enced by the larvae. Finally, we measured the survival of larvae in infested logs exposed to different cold regimes.

Methods

Supercooling points. Larvae were collected at random from infested trees felled in St. Paul, MN in June 2009. Supercooling points were measured using copper-constantan thermocouples (24 gage, non-stranded) following the methods of Carrillo et al. (2004). These larvae (n=11) were presumed not to be winter acclimated and provided a summer baseline. Larvae were again collected and supercooling points measured from late October to early December 2009 (n=62) and were presumed to be fully acclimated. Supercooling point data were analyzed in @Risk (Palisade Corp., Ithaca, NY) to determine whether the observations were normally distributed.

Larval winter survivorship.

Three green ash trees that were naturally infested with emerald ash borer were felled in St. Paul, MN on 28 Dec 2009. Logs (ca. 0.6 m in length) were taken from upper-, mid- and lower-canopy braches. Logs (n=20) from each tree and canopy level were sealed with paraffin wax and randomly assigned to each of five batches. Bark was peeled from logs of the first batch immediately to determine initial larval densities and condition. Each of the other batches was assigned to one of four treatments: (i) logs cooled to a target of -35°C in a sub- zero freezer; (ii) logs held outdoors in northern Minnesota near Grand Rapids; (iii) logs held outdoors in St. Paul, MN; and (iv) logs held in a walk-in cool room at approximately 4°C . We drilled 5.6-mm (7/32 in.) holes at an oblique angle to a depth of approximately 5 cm on the future north and south face of the smallest and largest diameter log within batches to be kept outdoors or in the walk-in cool room. We inserted a thermistor from a Hobo Pro v2, 2 ext temp (On-

set Computer Corp., Bourne, MA) into each hole and sealed the hole with high vacuum grease. The data logger was programmed to record temperature once every five minutes. We also screwed eye-bolts into the logs that were held outdoors, chained the logs together, and secured them with a padlock to prevent unauthorized removal. Logs held near Grand Rapids were further secured behind a locked gate. All handling procedures in northern Minnesota were reviewed and formally approved by the Minnesota Department of Agriculture. With the exception of the freezer treatment, all logs were exposed to their respective treatments for 5-6 weeks. For the logs destined for the freezer, we drilled 2.8- mm (7/64in) holes on the lower (in contact with a layer of polystyrene insulation) and upper (exposed to the air) surfaces of each log. We inserted a 24 gage copper-constantan thermocouple into each hole to record log temperatures. Logs were chilled to ca. -35°C and moved to the walk-in cold room for less than 72 hrs. For all treatments, after cold exposures were complete, bark was peeled from logs, larvae counted, and the condition of each larva noted. Larvae that did not move after repeated observations over 24 hrs were considered dead. Larvae that were not damaged during the peeling process were saved for additional observation and testing. Data were analyzed by using logistic regression (PROC LOGISTIC in SAS).

Results and Discussion

Supercooling points. Winter-acclimated larvae (collected between Oct-Dec) had a mean supercooling point of -25°C (-13°F), which was significantly colder than the supercooling point of non-acclimated larvae (-18°C ; 0°F ; $t=5.1$, $df=13$, $P<0.01$). Supercooling point observations from the winter-acclimated larvae were not significantly different from a normal distribution (Chi-square = 5.7; $P>0.1$). From our simple model that related the coldest temperature experienced by emerald ash borer larvae to the

extent of mortality, we predicted that when larvae reach -17.8°C (0°F), 5% will die; at -23°C (-10°F), 34% will die; at -29°C (-20°F), 79% will die; and at -34°C (-30°F), 98% will die.

Larval winter survivorship.

More than 90% of the larvae that were recovered at the start of the experiment were of “good” color (buff-yellow) and actively moving. A statistically equivalent proportion was moving when extracted after ca. 5.5 weeks in the walk in cold room, a treatment where we predicted no mortality. A significantly lower proportion of the larvae moved after being extracted from logs held outdoors in St. Paul. Only 5-10% of larvae moved after being extracted from logs held outdoors near Grand Rapids, MN or chilled in a sub-zero freezer. Approximately 40% of the larvae from near Grand Rapids had turned brown, clear evidence of tissue damage and strong additional evidence for mortality.

Follow-up observations confirmed that 100% of the larvae that were brown were clearly dead 3 weeks after extraction. Between 75-85% of larvae that were inactive at the time of extraction were dead 3 weeks after extraction, while only 5-15% of the larvae that were active at the time of extraction were dead after the same amount of time.

Minnesota winters, especially in the northern part of the state, may cause substantial mortality of emerald ash borer larvae. However, even with the extreme cold air temperatures that were experienced near Grand Rapids, MN, some emerald ash borer larvae survived. Thus, cold temperatures may not completely eliminate the insect. However, cold temperature may help to keep populations from building quickly and may give ash trees some time to recover from initial attacks.

We have also learned that air temperatures, recorded at standard meteorological weather stations, are not necessarily the most reliable measure of the temperature experienced by overwintering emerald ash borer larvae. Trees warm considerably on sunny days through radiant heating. Larvae that are able to form a pupal cell in the outer sapwood may be afforded some protection against brief drops in temperature.

These results have significant implications for predictions of the future range of emerald ash borer, spread rates of the insect in areas with a harsh winter climate, and the time required for these insects to kill a tree.

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One Big G

By Jake Kocak, Assistant S



From open until close, this past golf season, 2013, will go down as one of the shortest in recent memory. At Somerby Golf Club, we had our hands full with not only maintaining the golf course to championship standards, but also with the construction of a one-acre putting green (the putting green was built within a subdivision of the

Somerby Community surrounded by 29 new lots). With all of the challenges the construction process brought, the 2013 golf season felt much longer than the calendar indicated for the staff at Somerby,

The project was contracted out to Greenseth Golf, with Scott Greenseth being the owner/opera-

reen



Superintendent Wayzata Golf Club (Former Assistant at Somerby Golf Club)



tor; he was essentially a one man show and our staff provided him with help on a daily basis (anywhere from one person to our entire staff depending on the day). Scott is to be credited and commended for the design of the green and the overall flow of it. See pictures for the design and layout; the green is really long and not very wide, roughly

about 800'x 50' with the goal being to touch as many lots as possible.

The green also has really nice flow and undulation, with two bluegrass mounds in the middle of it and a 22 foot elevation change from one end to the other. The green was seeded with A-4 bentgrass on a profile with 4" pea rock and a 10"

89/11 greens mix. Both sand and gravel were from a local sand/gravel pit and the sand was blended with the peat locally as well. The goal was to keep the new putting green profile and grass type similar to the

myself, but everyone who was involved. Anybody who has done similar construction or renovation projects can attest to the fact that they can be mentally, physically, and emotionally draining; filled with



other greens on the golf course. We went through 136 pallets of sod (88 bluegrass, 48 fescue) on the surrounds and the two bluegrass mounds in the middle, and planted 47 trees as well. With the late spring, the project got a late start as well and ultimately took the better part of four months to complete from start to finish. The green was seeded on the third of September.

This project was a unique experience to be a part of, not only for

long days, setbacks, weather interruptions, and unforeseen issues.

As soon as we seeded the green, finished the surrounds and the green began to take shape, we could see our hard work come to



fruition and it made it all worth it. In reflecting upon the process, the analogy I keep coming back to is that of running a race.

You plan and prepare months in advance for everything, just like you would train prior to a race. Once race day approaches or construction begins,

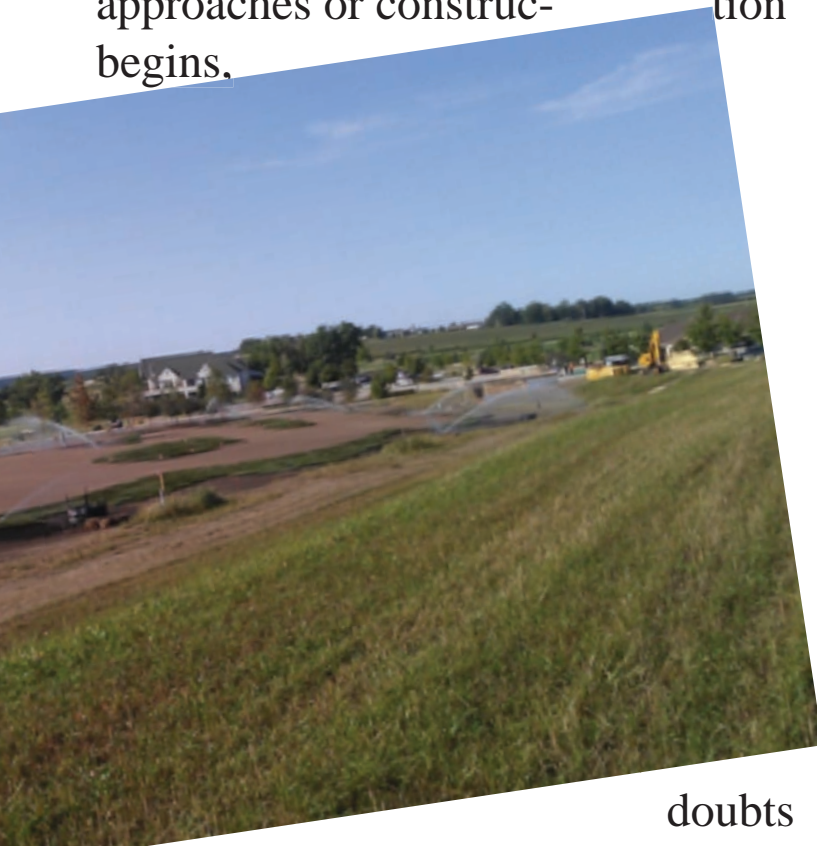
start to creep into your mind whether you've



ad-

equately prepared or trained yourself for absolutely everything. Then, during the actual race or construction phase you encounter hardships and setbacks, but you ultimately get through them and persevere. When the race is over or the project is complete you look back on it and you're proud of what got accomplished, and all of the hardships and setbacks seem like blips on a radar and you're ready to do it again, just next time maybe something a little more normal in scale.

The entire GCM staff at Somerby is doubts to be commended for the completion



of this project; as I stated above, Scott was by himself to essentially do the shaping and technical work, the rest of the work fell to our staff. We were fortunate that our intern, Tyson De-Meyer, had many years of experience in the golf course construction/renovation side of things and so he was a huge asset and offered a unique perspective throughout the project. Obviously a lot of credit has to go to Scott as well, he put in countless hours and really had a unique eye, and it shows in the visuals of the green.

A project of this magnitude takes a ton of planning and preparing and as the project gets going, things can sometimes change and frankly this whole

project would have been stuck in neutral all summer if it was not for Superintendent Eric Counselman. Getting ownership, management, contractor, and employees all on the same page and heading in the same direction was an endless task, but was also the main reason this project was a success. The pictures will do more justice than me trying to explain it, and seeing it in person will do it even more justice; so enjoy the pictures and hopefully many of you can make it down to Somerby Golf Club to see it in person. If anybody has any further curiosities or inquiries, they can contact Eric at ecounselman@somerby.com.



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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 Scholarship Management Services. 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, SM, C, D, 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, SM 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, Associate and Affiliate members. These awards are not renewable. However, stu-

dents 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 Scholarship Management Ser-

vices with current transcripts and to notify Scholarship Management Services of any changes of address, school enrollment or other relevant information. Except as described in this brochure, no ob-

ligation is assumed by the MGCSA.

Application Deadline:

June 1, 2014.

More info at: www.mgcsa.org



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Bees rely on flowers to supply them with the food they need to survive. Some flowers (e.g. tomatoes) provide only pollen, the main source of protein for bees. Other flowers (e.g. clovers) provide both nectar and pollen, thus providing both protein and carbohydrates.

There are hundreds of different bee species in Minnesota. Different types of bees prefer different flowers. Some of these preferences are due to the physical size or shape of the bees and the flowers. Some flowers have long tubes with nectar at the bottom. Long-tongued bees are the only bees able to reach the nectar. Other preferences are based on nutritional needs. Some bees are only able to raise their young with pollen from particular plants. These bees are called “specialists”. Other bees are “generalists” and will collect pollen from a wide range of plants.

There are also seasonal differences in the activity of different bee species. Many bee species forage as adults for only a few weeks out of the year, with different species emerging throughout the spring and summer, into early fall. The rest of the year, the young are developing in nests that are underground or in cavities. Each bee was provided with a pollen ball, a mixture of pollen and nectar, left there by their mother. They will emerge the following season. Many other bee species, including honey bees and bumble bees, are present through the entire spring, summer and early fall.

Providing a diverse array of plants will help ensure that you support a diverse array of bee species. Do your best to provide blooming flowers from April to September.



Agapostemon metallica on *Symphytotrichum* sp.
Photo by Karl Foord



Apis mellifera on *Dalea purpurea*
Photo by Heather Holm



Bombus auricomus on *Monarda fistulosa*
Photo by Karl Foord

This list is not inclusive of all plants that bees will visit in Minnesota. These are flowers that are particularly attractive to bees and can be easily integrated into most landscapes.

 = Tree  = Herbaceous plant  = Shrub  = Full sun  = Part-shade  = Shade

Early=March to May Mid=June to July Late=August to September

Scientific name	Common name	Habit	Sun	Native	Bloom time	Honey bees	Other bees
<i>Crataegus crus-galli</i>	Hawthorn			X	Early	X	X
<i>Geranium maculatum</i>	Wild geranium		 	X	Early		X
<i>Penstemon grandiflorus</i>	Large beardtounge			X	Early		X
<i>Salix discolor</i>	Pussy willow			X	Early	X	X
<i>Coreopsis lanceolata</i>	Lanceleaf coreopsis		  	X	Early to Mid	X	X
<i>Hydrophyllum virginianum</i>	Virginia waterleaf		  	X	Early to Mid	X	X
<i>Lupinus perennis</i>	Wild lupine		 	X	Early to Mid		X
<i>Aruncus dioecus</i>	Goatsbeard		  	X	Mid	X	X
<i>Echinacea angustifolia</i>	Purple coneflower			X	Mid	X	X
<i>Lobelia siphilitica</i>	Blue lobelia		 	X	Mid		X
<i>Pycnanthemum tenuifolium</i>	Slender mountain mint			X	Mid	X	X
<i>Agastache foeniculum</i>	Anise hyssop		 	X	Mid to Late	X	X
<i>Asclepias incarnata</i>	Swamp milkweed		 	X	Mid to Late	X	X
<i>Borago officinalis</i>	Borage		 		Mid to Late	X	X
<i>Chamaecrista fasciculata</i>	Partridge pea			X	Mid to Late	X	X
<i>Cirsium discolor</i>	Bicolor thistle			X	Mid to Late	X	X
<i>Dalea purpurea</i>	Purple prairie clover			X	Mid to Late	X	X
<i>Eupatorium maculatum</i>	Joe-pye weed		 	X	Mid to Late	X	X
<i>Eupatorium perfoliatum</i>	Common boneset		 	X	Mid to Late	X	X
<i>Helianthus spp.</i>	Sunflowers		  	X	Mid to Late	X	X
<i>Hylotelephium telephium</i>	Autumn joy sedum		 		Mid to Late	X	X
<i>Impatiens capensis</i>	Jewelweed			X	Mid to Late	X	X
<i>Liatris aspera</i>	Rough blazingstar		 	X	Mid to Late	X	X
<i>Monarda fistulosa</i>	Beebalm			X	Mid to Late	X	X
<i>Nepeta x faassenii</i>	Catmint		 		Mid to Late	X	X
<i>Origanum vulgare</i>	Oregano		 		Mid to Late	X	X
<i>Ratibida pinnata</i>	Yellow coneflower			X	Mid to Late		X
<i>Silphium perfoliatum</i>	Cup plant			X	Mid to Late	X	X
<i>Trifolium hybridum</i>	Alsike clover		 		Mid to Late	X	X
<i>Vernonia fasciculata</i>	Ironweed			X	Mid to Late	X	X
<i>Veronicastrum virginicum</i>	Culver's root		 	X	Mid to Late		X
<i>Solidago rigida</i>	Stiff goldenrod		 	X	Late	X	X
<i>Symphotrichum lateriflorum</i>	Calico aster			X	Late	X	

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Within the Leather

by David Kazmierczak, CGCS

As I look at my calendar on Wednesday, March 19, 2014, I see there are two appointments today that I need to tend to and one tomorrow. Friday is wide open as I am going on a small trip with my family to Milwaukee to visit friends on the back end of spring break. It's not Cancun, but at least we are getting away from here for a day or two.

A closer glance at the calendar reveals a disturbing two word revelation in very small font. The calendar says tomorrow spring begins. A quick glance to my right, peering outside my office window at three fresh inches of snow upon heaps and mounds of now petrified, crusty old snow, begs a couple questions: Did the originator of the first calendar live in Texas, or did they save a large bag of a certain cash crop for late March distribution and consumption? Either way spring in Minnesota in 2014 is at this moment is just a nasty rumor.

Now I know that the first day of spring is

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simply about the rotation of the earth on its axis as it pertains to the sun and all that and means nothing when it comes to actual weather patterns, especially in the northern United States. But come on, seriously? After the brutal winter on 2013-2014 in Minnesota are we really in store for another month of below average temperatures, snow and general misery?

I say all this with a bit of tongue in cheek. Surely if you have lived your entire life in Minnesota or are even a 15 year transplant like me you understand that this is not an anomaly. Winter can and usually will progress well into April and by golly that's what you signed up for. If you don't like it- leave. However, with this being the second consecutive year of potential late openings at golf courses there is a real danger associated with what most would perceive as just a miserable inconvenience. Golf courses are businesses. They only make money when they are open. There is a limited time for that around these parts and delays means a cut in revenue, and cuts in revenue for a business that is operating on thin margins is not good.

Unfortunately, something has to give. I am concerned that if this

weather pattern continues, and golf courses opening in May instead of April becomes the norm, it will greatly impact our industry locally. April for many public golf courses is essentially a make or break month. It's the difference between a good revenue year and a bad one. Take away April a few years in a row and I'm afraid there might be a few courses that simply will give up and close.

Now there is a line of thinking out there that is just exactly what needs to happen. The dwindling golf market has hit the point where there is more supply than demand and the natural attrition of golf courses is better in the long run for the industry. That might be somewhat true unless you happen to work at one of the shuttered properties. Then April means a whole lot more than it used too.

I prefer to think that if one golf course dies, we all take a hit. It means that all the guys on the crew are out of a job. It means they will be looking for employment in a full market and probably have to look elsewhere. It means one less course for our vendors to sell to, meaning they then will have to find ways to keep their margins up, potentially raising prices and lowering industry support. It means the scaling back of our industry. So what can be done about it?

Well, obviously we can't change the weather. (Although you and I know that there are people at your club who think that maybe you should be able to). So perhaps it's time to get really creative with things like budgeting, labor scheduling, expense tracking and the like. If it means saving your job, and the jobs of your crew, I can imagine you would do just about anything. I can see real potential in equipment sharing and maybe even people sharing in the future if things deteriorate.

In any case, maybe it is time to get out ahead of the curve and start to investigate these kind of money saving ideas if they haven't been done before or revisit some of them if they were not fully explored. The sky is the limit when it comes to imaginative thinking and while not every good idea is workable, creative thinking usually brings about efficiency and cost saving. After all, looks like you will have plenty of time to ponder while watching the snow slowly melt. You can use your time to think of ways to streamline your operation, or pray for 60 degrees and sunshine.

Either way you are doing something. C'mon spring, hurry up!