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VIEWPOINT > JOHN SCOTT, AGS



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The Light at the End of the Tunnel

As I write this article, golf courses

have been in full swing for almost 2 months and have been as busy or busier than last season. The only exception was Ontario having to close their golf courses. It is good to see Ontario reopen and allow the public to golf and enjoy their great facilities. With these increases in rounds one thing that stands out is how safe golf is to the public. Thankfully we have not had a major outbreak of COVID-19 at a golf facility, due to the professionalism of the management teams

CGSA members are and have been strong leaders throughout this pandemic. The staff at CGSA has been working hard communicating important information on safety protocols out to its membership and members have been implementing these protocols.

Provinces are starting to relax covid restrictions with restaurants and businesses opening up to the public. This is due to reduced cases and more people getting vaccinated. With these positive steps moving forward we are tracking well to have our East and West Fall Field Days. This will allow us to get together (2 meter spacing) for a few days of education, golf, and socializing. It has been very hard on everyone, but I see a light at the end of the tunnel.

As we move forward through this pandemic, CGSA staff are starting to make plans for the Canadian Golf Course Management Conference. We have been successful virtually and know we can go that route if we have to, but we are anticipating returning to an in-person conference. If we continue to have improved covid numbers, we can see proceeding with our normal conference format. This will all be planned with the strictest safety protocols in place. CGSA will keep its members updated as we move forward with these plans.

I look forward to hosting the CGSA Fall Field Day on September 14. This will be my second Fall Field Day that I will have hosted, and I look forward to having my peers visit our beautiful facility. I think it is important to get out and finally see other superintendents and suppliers in person and have great conversation, food, and beverages. This is what brought me to the CGSA 36 years ago, getting together and spending time with superintendents and industry reps from across the country. It is very important to keep up these friendships.

Please stay safe and enjoy the summer as the country opens up. **GM**

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La lumière au bout du tunnel

Au moment d'écrire cet article. l'activité a repris de plus belle sur les terrains de golf, et ce, depuis près de deux mois. Nous remarquons même un achalandage accru par rapport à la dernière saison. Seule exception, l'Ontario, où les terrains de golf ont été fermés pendant une longue période. Mais aujourd'hui, ils sont de nouveau ouverts, au grand bonheur des golfeurs. Comme le démontre tout ce regain d'activité, le golf est un sport qui ne présente aucun danger pour la santé du public. En effet, en raison du professionnalisme des équipes de gestion, nous n'avons pas connu d'épidémie majeure de COVID-19 sur les terrains de golf.

Tout au long de cette pandémie, les membres de notre association ont pris à cœur leurs responsabilités en appliquant rigoureusement les protocoles de sécurité relayés pas le personnel de l'ACSG.

Grâce à l'assouplissement des restrictions liées à la covid dans les différentes provinces, les restaurants et entreprises ouvrent de nouveau leurs portes. Cela est dû au fait de la diminution des nouveaux cas et de l'augmentation du taux de vaccination. Étant donné ce bilan positif, nous pouvons maintenant envisager de tenir nos tournois de l'Est et de l'Ouest cet automne. Cela veut dire que, si les conditions le permettent, nous pourrons nous réunir (espacement de 2 mètres) pour quelques jours de formation, de golf et de réseautage. Cette dernière année a été très dure pour tout le

monde, mais je vois maintenant la lumière au bout du tunnel.

Tout en restant vigilant face à cette pandémie, le personnel de l'ACSG active les préparatifs en vue du Congrès canadien des gestionnaires de terrain de golf. Au besoin. la voie virtuelle reste toujours une option, mais nous prévoyons que notre prochain congrès se tiendra en personne. En effet, si l'incidence de la covid continue à diminuer, nous reviendrons à notre format habituel. Nous le ferons en mettant en place des protocoles de sécurité très rigoureux. L'ACSG tiendra ses membres au courant au fil de l'avancement de ses plans.

Le 14 septembre prochain, j'accueillerai sur mon parcours le tournoi automnal de l'ACSG. Ce sera la deuxième fois que j'organise un tel tournoi et j'ai hâte de faire voir nos magnifiques installations à mes pairs. Je pense qu'il est important de sortir et de finalement rencontrer en personne d'autres surintendants et fournisseurs pour parler autour d'un verre et d'un bon repas. Je dois d'ailleurs dire que ce sont les contacts sociaux avec les surintendants et les représentants de l'industrie de tout le pays qui m'ont tout d'abord motivé à adhérer à l'ACSG, il y a 36 ans. Il est très important de maintenir nos amitiés

Cet été, la vie reprend son cours normal. Profitez-en et soyez prudent! *GM*

COVER STORY MARK LANE, SUPERINTENDENT, THE MEMPHREMAGOG GOLF CLUB 2020 CGSA/RAIN BIRD ENVIRONMENTAL ACHIEVEMENT AWARD WINNER



Figure 1: Fescue and naturalized areas 12 and 13.

Since the surveying of the land in 2004, the protection of the surrounding environment and Lake Memphremagog, have been a focal point for both the city of Magog and the club's founding members.

In 2010, The Memphremagog Golf Club achieved certification with Audubon International, and our most recent recertification process was at the end of 2020. Being a member of Audubon International, helps drive us forward in our mission to be as environmentally responsible as we possibly can. When I was hired in the spring of 2012, I decided to embark on a naturalization program.

Thomas McBroom's design of the course and the lay of the land, gave us many opportunities to naturalize areas throughout the property. Certain areas of the previously maintained roughs were naturalized or completely converted



Figure 2: Bunker on #7 in 2019.

to a blend of fescues and the majority of the bunker contours are no longer mowed throughout the season. I found that the design of the bunkers, combined with the tedious task of maintaining them weekly, welcomed the change to a more natural style.

In Figure 1, the brown areas indicate fescue or naturalized areas that have been introduced over the years. More areas in this photo have been introduced or enlarged, since it was taken in 2016.

of au Nature



Figure 3: Fescue bordering the right of #9.

Figure 4: Renovation of hole #8, 2020.

From 2008 to 2011, all of the 63 bunker contours were fully maintained on a weekly basis and so were many more acres of bluegrass roughs. Previously, the mowing of the bunker contours required 84 staff hours/week and now we are able to maintain them with 44 staff hours/week. With the naturalization program, only 36 fully maintained bunkers remain on the course, with the majority of them being the smaller greenside bunkers. In my opinion, the added colour and texture of the fescue is a wonderful addition to the layout of the course, giving it a more natural appeal. This program has also been very well received by our membership.

By introducing the naturalized and fescue zone, we have also been able to reduce our inputs in other ways. Mowing the rest of the rough now takes approximately 60 staff hours/week, compared to 100 staff hours/week, from when I first started at Memphremagog. String trimming has also been cut from approximately 32 staff hours/week, to 8 staff hours/ week. Now, there is less potential for damage to the trees, less wear and tear on equipment and less use of fuel, water, and fertilizers.

In the fall of 2020, we converted another 60,000ft² to fescue, when we renovated the 8th hole. As we renovate each hole and convert areas to fescue, we reconfigure the irrigation system "in-house" to target areas more precisely and use less water. For example; on #8 we replaced full circle heads for our greens with part circle heads, to target the greens only and to stop throwing extra water into the rough and into the adjacent pond. We also reconfigured the rough heads, to water the bluegrass only and we used a mix of full circle and part circle heads in triangular patterns, to maximize our efficiency.

We did the same on the tee decks, by replacing the row of full circle heads, with a triangular pattern of part circle heads. We no longer throw water into the woods or into the new fescue zones, reducing our waste of our vital resource. In the spring of 2021, we intend to convert another 25,000ft² to fescue on the 16th hole and in the fall, we will embark on a renovation project of the 17th hole, where we will convert another 2 acres. These projects will also include improved irrigation to reduce our use of water and maximize our efficiency.

The reduction in the acres of fertilized turfgrass is an important aspect of the management of the golf course, as we are mandated by the city of Magog, to do regular water

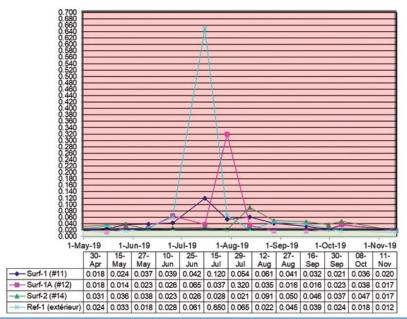


Figure 5: Phosphorus Table from 2019.



Figure 6: Filtering Bed #11.

testing. During our operating season, which runs from mid-May to mid-October, we are required to test the surface water at four locations every two weeks, for Phosphorus.

The major concern, is that we are not adding to any high levels of Phosphorus in Lake Memphremagog and contributing to the outbreak of any blue-green algae (cyanobacteria). One of the four sampling sites, is a reference point (Ref-1) that is located adjacent to the property. In Figure 5, you will notice that the reference point, is often higher in P, than the water being sampled from within the golf course.

We are also required to test for all pesticides that will be used on the property. There are nine sites on the course, including the four surface water sites previously mentioned and five well sample sites. The samples are taken four times a year, with the first sample being taken before any fertilizers or pesticides have been applied. The fourth and final sample of the season, is taken after the snow mold applications have been applied in early November. If we are unable to test for an A.I. then we are not allowed to use it. If we stop using a specific A.I. then we still need to test for it, for two more years.

These thirty-six sample results, are part of a sixty-five-page annual report that is submitted to the city of Magog that includes all of our pesticide and fertilizer applications for the year.

To help prevent the release of excessive nutrients and pesticides from the golf course, there is a filtering bed on the 11th hole. The excess water runs through the course's drainage system and its Boulder Creek, into the pond at point #1 and then exits at point #2 (above). Specific aquatic plants have been planted within the pond, to help act as a filtering system. Once the water leaves the property, it then filters through another marsh, before it eventually into flows Lake Memphremagog.

In my nine seasons at Memphremagog, we have never had a nonconformity, with a water sample for pesticides. We look forward to continuing our role as environmental stewards. **GM**

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TAKE BACK

► FEATURE ► BET SMITH AND DAVE C. SMITH, DCS & ASSOCIATES

Compaction Heavy **Traffic**



Fig. 1: Entrance/exit areas between two bunkers where wear from foot traffic to and from the green is a frequent problem. (Photo courtesy of Jeff Stauffer)

TURF WEAR

Wear stress is described in Turf Management for Golf Courses by James B. Beard, as "The collective direct injurious effects of traffic on turf; it is distinct from the indirect effects of traffic stress caused by compaction."

Turf wear occurs when turfgrass blades come in direct contact with tires on golf cars and maintenance equipment as well as from foot traffic. Areas of constricted traffic flow, such as around trees, bunkers, berms and the end of golf car paths are frequent locations where turf wear becomes evident during

times of stress or heavy use. Wear from foot traffic is generally most evident close to the green, especially when entrance and exit points are limited.

The best way to manage turf wear is to stop or minimize it from happening in the first place. Traffic flow is key to managing wear. Turf wear can be the result of more traffic than the course was originally designed to withstand. Thoughtful design changes are often required.

Turf wear can also be the result of placing bunkers or trees in principle traffic flow areas after the course has been constructed. It is very important that traffic flow be considered whenever features or trees are planned on the golf course. Once course features are identified as obstructions to traffic flow, it may be necessary to remove the tree or feature.

CONSIDERATIONS ON THE GREEN

When the design of a green is such that entrance and exit points are limited, turf damage can occur, even after few rounds. The USGA published an excellent guide titled, "Helping Your Greens Make Grade" back in 1998. This article has stood the test of time.

In the article they suggest that the ideal green-site would possess four readily usable entrance and

and Turf Recovery

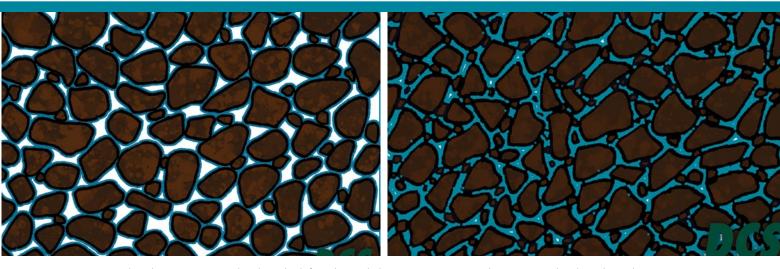


Figure 2 and 3: the un-compacted soil on the left with ample large pore spaces vs. the compacted soil on the right where fine soil particles have shifted into the larger pores to create a compacted soil.

exit points. Obviously, topography will not always facilitate the design of greens with four entrance/exit points. This serves as an excellent benchmark, however, for determining potential for wear around golf greens.

Considerations on the green itself are topography, traffic flow across the green and the number of hole locations. Let's consider that on average it takes 14 days for a hole location to recover. Assuming each hole location has a radius of 8' (200 sq. ft.) then 2800 square feet is required to support 14 individual hole locations.

The ten-foot-wide perimeter inset from the edge of the green is generally considered unsuitable for hole location. Therefore, on a 5000 square foot green, you have 2200 square feet that are unusable as cupping area. Thus, potential cupping area is limited to a maximum of 2800 square feet before accounting for slope. This is an important limitation to consider when determining cultural management practices for greens.

In the sample green above there is only one obvious entrance and exit point with the primary cupping area at the front of the green. Regardless of where the hole is located on the green, all traffic must pass over this primary cupping area, subjecting the area to considerable wear and potential compaction regardless of where the hole is located on the green.

SOIL COMPACTION

Soil Compaction is described in Turf Management for Golf Courses by James B. Beard, as "An increase in the soil bulk density, and concomitantly a decrease in soil porosity due to the application of mechanical forces to the soil."

Almost all soils will compact. Compaction is simply the arrangement, or rearrangement, of fine textured soil particles so that more of the larger air-filled (or drainage) pores are plugged with fine soil particles. As the number of larger pores is reduced, the rate of water movement through the soil is reduced. The amount of air in the soil decreases resulting in a decline in root growth and plant health.



Fig. 4: Aggregates found in agricultural soils are prone to compaction when used in a turfgrass setting.



Fig. 5: Whenever possible, consider directing traffic flow at the terminus of a cart path away from the direction of play in a way that those using golf cars have several options for exiting the cart path.

Modern golf greens constructed with an appropriate sand are more resistant to compaction than soilbased greens. Sand-based growing mediums are typically manufactured with reduced levels of fine and very fine sands so that compaction is easier to manage.

Working with topsoil requires a different strategy, making an understanding of soil aggregation a valuable asset. Soil aggregates are comprised of various quantities of silt, clay and small sand particles. While soil aggregates work well for agriculture they tend to break down and become prone to compaction in a turfgrass setting. Cultural management including soil aeration by various means is required to manage soil in high-use areas.

THE VALUE OF A SOIL COMPACTION METER

A soil compaction meter will help identify compaction zones within the soil profile. These meters are economical and an excellent tool for monitoring soil compaction. They are also handy as a demonstration tool for staff and decision makers.

The use of a compaction meter is not an exact science. There are a number of factors to be considered when using a compaction meter. Percent moisture, soil texture, organic and/or mineral soil layers should all be considered when using a compaction meter. It is good practice to log soil moisture and compaction values together. Compaction meters measure soil resistance in either pounds per square inch (PSI) or Kilopascals (KPa). Pounds per square inch is most common. As a benchmark, compaction meters consider values ranging from 0 to 200 PSI as ideal and 200 to 300 PSI as intermediate. Greater than 300 PSI is considered to be too compacted for sufficient root growth.

It is important to remember that these values are used for all crops and plants. To get the full value from efforts to monitor compaction, we recommend the meter be used often and site-specific values be monitored with a goal toward calibrating the meter to the property.

TURF RECOVERY

One cannot discuss methods for turf recovery without taking a holistic approach to the remediation process. Factors to be considered include fertility, aeration, traffic management, mowing equipment and patterns, shade, irrigation and drainage.

Traffic Flow and Golf Cars

Golf cars can do considerable damage to a golf course if traffic flow is not controlled. The end of cart paths is probably where most damage is noticeable.

Whenever possible, consider directing traffic flow at the terminus of a cart path away from the direction of play in a way that presents golf car users with several options for exiting the cart path. Sometimes roping and direction signs are the only option.

Aeration

Aerators are used on golf course turf areas for two main reasons: to relieve soil compaction and to remove organic matter from the surface. Both reasons are important for managing turf wear and compaction.

As thatch levels begin to exceed 2 cm the turf begins to hold too much water following irrigation, becoming more prone to disease and insect pressure. The health and vigour of the root system becomes increasingly compromised when the root system remains too wet. While some thatch is required to enhance resistance to wear, efforts to control thatch at or slightly below 2 cm is important.

While turfgrass roots seldom grow to a depth of 30 cm, aeration is required to that depth to provide adequate drainage so that plant roots and soil microorganisms have access to required oxygen within the effective root-zone. Soils tend to compact in layers. Often turfgrass soils compact at the base of the core aeration zone, approximately 7 cm below the surface, compromising the movement of water, air exchange and turfgrass roots beyond that point.

It is important to consider aeration equipment and techniques that will break through compaction layers that develop in high traffic areas. Unfortunately there is not a "one size fits all aerator" that can be used to manage thatch as well as soil compaction to a depth of 30 cm.

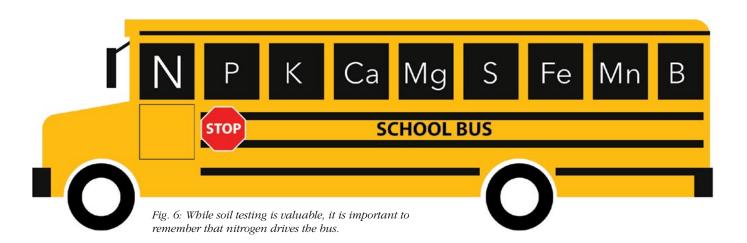


Fig. 7: Often turfgrass soils compact at the base of the core aeration zone, approximately 7 cm below the surface, compromising the movement of water, air and turfgrass roots beyond that point.



wear due to turning of the mowers. Striping of fairways may best be put on hold during periods of high stress.

Irrigation

Often turf stress due to wear takes place in areas where irrigation coverage is less than ideal. It is important to monitor soil moisture at the surface with either a soil moisture meter or a soil probe but also important to inspect the soil for moisture as it moves throughout the complete 30 cm root-zone.

Shade

Turfgrass requires 8 hours per day of direct sunlight to optimize turf health and vigour. During mid-summer, when days are 16 hours long, sunlight is seldom a limiting factor. During the shoulders of spring and fall however, the average day length approaches 8 hours in total. Should turf be shaded during this important time of year when the plants are building carbohydrate reserves in preparation for winter and spring, plant health can be compromised resulting in turfgrass plant more prone to traffic stress. The effect of shade is an important factor to be considered in high traffic areas.

PREPARATION FOR 2022

Golf and other outdoor activities have been crucial to our mental and physical wellbeing throughout the COV-ID-19 pandemic. While the industry as a whole has come through the pandemic in good shape, the popularity of golf has resulted in increased wear and compaction in 2020 and 2021. As fall approaches we all look forward to preparation for another busy season in 2022. **GM**

photos by Bet Smith

Deep-tine aeration with machines equipped with soil aeration tines or slicing knives are required to break through the compaction zone, especially in high traffic areas such as the ends of golf car paths and near greens.

Fertility

Soil fertility is an important consideration when managing turf wear. It is standard practice to maintain soil fertility by testing the soil on a regular basis and making corrections as required. While soil testing is valuable, it is important to remember that nitrogen drives the bus.

Nitrogen is an important consideration for managing mass flow from turfgrass roots up into the leaves. Without adequate nitrogen the plant cannot take up other nutrients. As an example, in most parts of southern and central Ontario, turfgrass requires 3 lbs. of nitrogen annually to maintain health and vigour. Additional information on growth potential is available from the scientists at PACE Turf: paceturf.org.

How nitrogen is delivered to the plant is important. When turf stress is minimal nitrogen can be applied in higher amounts than when it is under stress. During times of stress consider applying nitrogen through light and frequent applications.

Mowing

Mowing can have a significant impact on turf wear. Mowing patterns may need to be adjusted to minimize

► FEATURE ► STAN KAZYMERCHYK, FRANK KOO, NISHANT KUMAR, ARDIT KAPRI AND STEVE PEARDON INTERNATIONAL TURF STUDENTS AT KWANTLEN POLYTECHNIC UNIVERSITY (KPU)

Canada Has



Kwantlen Polytechnic University (KPU) has experienced a large increase in International students since 2017, similar to most Canadian universities. Some students have chosen Horticulture for their educational path and of these, some have discovered the passion of

Turf Management that we all share.

Three International Turf students were asked the following questions:

- Why did you choose to do your education in Canada?
- Why did you choose Turf Management?
- Where have you worked in Turf?
- What do you enjoy most about being in Turf?
- Where do see your career going?

Here is a summary of their stories, along with thoughts from a local superintendent with the most exposure to their performance.

Gone Goba

KPU Turf students at 2020 WCTA Conference:

Stan Kazymerchyk (KPU), Nathan Hagel (Mount Paul GC), Brendan McLaughlin (Westwood Plateau GC), Nishant Kumar (India), Ardit Kapri (Albania), Dallin Hummelle (Quilchena GC), Frank Koo (South Korea), Kirandeep Kaur (India), Kiranjit Kaur (India).

FRANK KOO

I came to Canada from South Korea to educate my children and to find a new career. I needed a practical and attainable career and chose the Horticulture Program at KPU.

In my first 6 months in Vancouver, my children were in school while I played golf on weekends with friends. Then I decided to change my life, adapt to my new environment and continue life's journey. What does turf work mean to me in my 50's with a responsibility to support my family? The golf industry seemed to provide not only a sustainable way of recreating my life but also the most rewarding work, since I can work and learn at the same time.

I have worked at two courses here, Mayfair Lakes GC and Morgan Creek GC. Though my roles were not big, I was in the middle of adaptation and I have been satisfied with chances to prove that I am qualified to learn more. I am grateful to the superintendents, Steve May and Alan Ayres, who have given me a chance to understand maintenance work and to experience how diligent workers contribute to their responsibilities in every position.

As a turf student, sometimes I daydream...what if the ball becomes a little bigger with the same mass to reduce the impact on greens and to increase the air resistance on balls, and to reduce the carried distance. We can then find balls easier and the height of cut can be increased accordingly if the ball becomes larger. Play can perhaps become less fun and players may oppose the change. However, I think this is much more sustainable.

I want to work towards changing practices in a more sustainable way and to help people work and play in a healthy environment.

NISHANT KUMAR

I came to Canada from India for my diploma in Horticulture Technology.

I was always an athletic person and had a keen interest in sports. Back home when I watched cricket, I saw glimpses of the grounds crew at work and always wondered what they were doing. I had absolutely no idea about the turf industry when I came here.

I randomly registered for three subjects at KPU, and one of them was 'Turfgrass Operations'. After my first lecture things changed. I started to get a sense of how important the role of grounds crew is, which is unseen on TV. During our field trips I got an opportunity to see a golf course for the first time in my life and I was flabbergasted. The level of precision on the greens mesmerized me. By the end of the semester, I had made up my mind about joining the turf industry.

Soon enough, because of my interest in sports and passion for outdoor work, I decided to enter the turf industry. Stan Kazymerchyk introduced me to my job at Surrey GC in February 2020 where my boss, Steve Peardon, took me under his wing. He helped me understand all the turf operations on golf courses like mowing, irrigation, and other daily basic tasks. I worked full-time during the summer and part-time during the school year.

This past year has been a most exciting time working in the turf industry. I was a little skeptical about my job because it starts early morning, but things have changed. Now I am always excited to be at work and do whatever I am asked to do. The reason, I believe, is the visible results of everything I do and my passion for sports.

It is clear to me now that I want to pursue my career in the turf industry. I am planning to complete my diploma by the end of this year. After my graduation I will continue working in the turf industry. One day, I see myself working as a golf course superintendent. Until that happens, I am going to keep working on my skills with the same passion.



ARDIT KAPRI

I chose to pursue my education in Canada due to a suggestion I received from a relative of mine. I was told that BC is a great province to live, with many beautiful landscapes and great opportunities for youth. As a person who loves the outdoors and landscapes, horticulture is a great career fit for me.

I applied for my Horticulture Diploma and obtained my study permit from KPU. When I first landed in BC from a small town in Albania, I was stunned by the beautiful landscapes of the province and was very excited for the new opportunities both academically and professionally.

During my KPU orientation, I had the chance to listen to a presentation about Turf Management from the turf instructor at KPU. In the beginning, I had no idea what the word 'Turf' meant and I didn't know there was a career available with a Turf Diploma. As I was listening, I slowly started to understand. I always liked golf courses but never thought I would be able to make it in such a high-profile industry.

Stan spoke enthusiastically about the many career opportunities that are available in managing golf courses. I asked him if I had any chance to succeed in this industry coming from a different cultural and linguistic background.

The instructor connected me to Guildford GC, the nearest golf course to my home. In the beginning, it was challenging for me since English is my second language, and I didn't know the names of many tools and equipment. However, with the patience of superintendent, Chris Morach, and the crew I managed to learn many duties related to the golf course. I worked hard and did what I was asked.

Chris was very satisfied with my work and I was fully convinced that the turf industry is for me. I love

working at the golf course and decided to pursue the Turf Diploma. In my second semester at KPU I got my Pesticide Applicator License, became Spray Technician at Guildford and have continued to work hard.

I have really enjoyed the projects that we have been working on and satisfying clients by improving the golf course. Meeting many new people that are involved in different businesses and being able to perform all the turf duties makes my job enjoyable and pushes me to improve and set higher standards for myself.

In the near future I am hoping to be Assistant Superintendent at Guildford GC.

STEVE PEARDON, SURREY GC SUPERINTENDENT

We have employed three International KPU Turf students over the last few years, both part-time during the school year and full-time in summer. They have proven to be punctual, reliable, honest and show strong work ethic. Language has not been a significant issue. Progress was only a bit slow early on, but they quickly adapted to the equipment, jobs and the site.

These students listen attentively and follow instructions well. When learning new jobs they are careful, conscientious and soon get up to a productive pace. They are keen to learn and often discuss class topics and projects with Kevin and myself. Culture has not been an issue, as they have blended in well with crews of all ages. A great bonus has been sampling their real, homemade Indian cuisine brought in!

We have enjoyed watching them grow in confidence and comfort level. One of them is just graduating and will soon be joining our crew fulltime. We have no regrets at all, it is refreshing to have educated, dedicated youth on board. **GM**

Note: This article was previously published in the online edition of Turf Line News and has been reproduced and edited with permission.

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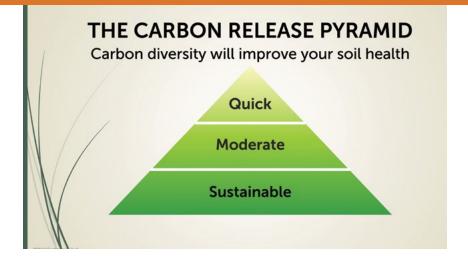
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FEATURE JOEL SIMMONS, AUTHOR AT EARTHWORKS

The of Carbon



One of the more popular soil management practices in the turf industry today is Biological Soil Management which focuses on providing diverse forms of carbon to help feed and proliferate beneficial bacteria and fungi in the soil root zone. When beneficial micro-organisms proliferate in the soil, ligneous carbon (thatch) is more easily digested, nutrients are better mobilized, pathogens have more competition, and roots can move deeper into the soil.

There is nothing new about carbon inputs in turf or agriculture, in fact carbon fertilizers were the "original" fertilizers, used long before the invention of processed synthetics. What might be new to many turf managers is the diversity and quality of some of the carbon-based products available for use in our industry today. It is this diversity of carbon inputs that drives the successes found in Biological Soil Management programs. It is also this diversity that truly allows turf managers to successfully reduce inputs, create sustainable soils programs, and maintain properties without the ups and downs associated with traditional inputs.

THE 411 ON HUMIC ACIDS

Perhaps the best place to start when talking about carbon inputs is with humic acids. Humic acids may be the most misunderstood of all carbon-based raw materials, partially because they were called "snake oils" for so long. Today, there are few turf maintenance shops that don't have at least a few products on the shelves that claim to contain humic acids. Some of the biggest conventional fertilizer companies are now realizing the value of humic acids as well.

Humic acids do not feed the plant or soil microbes but they do help provide a safe haven in the soil for microbes so they can actively proliferate. Humic acids are also very good at flocculating tight clay-based soils allowing more air and water to flow through which again supports healthy microbial populations.

Beware, many companies claim to have humic acids in their products but there are products, like lignosulfonates, that look like humic acids chemically but are not and do not function the same way. One good way to know you are getting a true and quality humic acid complex is to look for the HPTA logo. The Humic Products Trade Association is an independent group of chemists who have built the accepted standards for what humic acids are and what they are not.

COMPLEX AND DIVERSE MICROBES

When we combine humic acids with other forms of available carbon sources, we truly create a biological environment in the soil that proliferates beneficial soil microbial activity. What we want to avoid is what is often referred to as "linear" carbon products.

For example, kelp meal and fish meal are wonderfully rich carbon products that supply ample amounts of nutrients, 60 plus elements in the case of a good kelp product, and a long list of amino acids that help reduce environmental stresses on the plant. The individual products are good but when we combine more than a few together with a good

Importance Diversity

Soils Systems Approach

humic acid complex we significantly increase the power of the work that these carbon sources can perform.

The more complex and diverse the microbial food sources are the more diverse the feeding will be. This brings more diverse populations of microbes to the root zone. This is a significant help when you're trying to build biological sustainability. Think about when you go fishing and you use a specific bait to catch a certain type of fish, if your hook had multiple forms of bait maybe you would catch all types of fish. Perhaps a bad analogy, but the point is strong!

Other types of carbon-based products popular in the turf industry today include manure composts, meal based granulars, sludge, worm teas, fermentation solids, sea water extracts, molasses and other short chained sugars. With the exception of sludges, (which have been pasteurized to a point of killing microbes and burned up available carbon) all of these are good inputs, but are best when used in combination with other carbon sources.

Composted materials have a biological advantage that other sources do not have because microbes have done their magic and digested that material to a form easy for soil microbes to feed on. But, again, it is the diversity of raw materials that makes the real magic happen in the soil. Study your labels and choose products that can show you a true diversity in their formulations.



COMBINATION CARBONS ARE KEY

The key to building a really good carbon-based program is to provide a combination of long chained, medium chained and short chained carbons all together. For example, a really good combination for a carbon-based liquid would include the long carbon chains of humic acids and fish meal, the more medium carbon chains of kelp meal and worm teas, and the quickly available carbons in the form of molasses and other short carbon chains of sugars.

If all we fed the soil was sugar, the carbon would burn out quickly and we would create a lazy population of microbes. The point of feeding sugar is to get the microbes off the couch and out working, giving them the energy to start breaking down the other longer chained carbons found in the soil.

SOIL SYSTEMS APPROACH

The ultimate goal is to build an active environment where soil microbes can proliferate. The three-legged stool (above) shows us that chemistry, physics, and biology must work together so that the system can stand strong.

If we start with a good soil testing protocol, we can balance the soil chemically, which will allow the soil to open up physically, moving more water and air through the soil profile, promoting good soil biology. Without ample amounts of air and water, soil microbes simply cannot survive and grow in numbers.

As we balance the soil chemically, and provide a diverse diet of carbon, we can jump start the physical process allowing for better feeding of soil biology. That is the foundation of Biological Soil Management. **GM**

► MECHANIC'S CORNER ► BILL JANUSZEWSKI, FLEET MANAGER, CAPILANO GOLF AND COUNTRY CLUB, 2020 CGSA/FOLEY COMPANY EQUIPMENT TECHNICIAN OF THE YEAR

The Lithium Battery

There is a proliferation of battery powered equipment now available. A visit to any hardware store would show you that from the perspective of a homeowner, there is a battery powered solution to almost every piece of equipment.

Have a look around when you are driving (but watch where you are going); Tesla, Nissan, Kia, Chevrolet and BMW are all available in a battery powered version. And, the battery power of choice is Lithium-ion.

We aren't totally there yet with commercial turf equipment, but we are going down that road pretty quickly.

130 YEARS IN THE MAKING

Battery powered stuff has been around for a long time, over 130 years in fact. The first electric car in the United States was developed in 1890-91 by William Morrison of Des Moines, lowa; the vehicle was a sixpassenger wagon capable of reaching a speed of 23 kilometres per hour (14 mph). A little faster than a Club Car Carryall.

Of course, these were early generation lead acid batteries, which have evolved considerably. But, that same type of battery provides motive power for golf carts and starter current for internal combustion engines.

There are dozens of different types of batteries being made today, but the one that is taking center stage right now is the Lithium-ion battery. In its original form/chemistry the Lithium-ion battery wasn't that spectacular, but they kept improving



Main lithium battery pack riding mower.

and it can now power everything from a toothbrush to automobiles, airplanes, and ships. That's quite a range of applications but with turf equipment, we fall somewhere in the middle; think weedies to riding green's mowers and almost everything in between.

REASONS TO SWITCH TO LITHIUM-ION BATTERIES

Battery powered devices may appear outwardly simple. Charge the battery, stick the battery in the device, and go do your thing. Repeat, as necessary. Now for a toothbrush that works okay, but for a commercial grade, battery powered, rotary mower there is a bit more to it. And, you need to know what that is.

First of all, if troubleshooting and repairing electrical stuff is not in your wheelhouse, go to your local technical school or online training provider and learn some basics. You can do a lot of damage indiscriminatingly poking around with a test light and a test lead.

This article is based on Bill's presentation at the 2021 Canadian Golf Course Management Conference - The Move to Electric Power.

Revolution

So, let's talk about the reasons behind the decision to drop the traditional power source for equipment and replace it with Lithium-ion batteries. Firstly, there is no liquid fuel to handle (mixing gas and oil. adding fuel to the implement). There are no combustion gases and Lithium-ion batteries eliminate almost all leak points (Toro's eTriFlex has 2 gear boxes behind each traction motor that contain gear oil). There is less vibration and reduced maintenance. In most cases there is also less noise, which means fewer noise complaints/bylaw infractions.

THE DOWNSIDE TO LITHIUM-ION BATTERIES

There are also downsides to Lithiumion batteries. The cost of acquisition of Lithium-ion powered equipment can be 2 to 3 times higher than an engine powered equivalent and you may have to upgrade your electrical service to provide sufficient energy for charging. There is also additional training required for both operators and repair technicians.

You will now have a new waste stream to manage (spent Lithium-ion battery carcasses) and a protection circuit is required to maintain voltage and current within safe limits, which is built into the Lithium-ion battery pack. Lithium-ion batteries are also subject to aging, even if not in use. Lithium-ion is also not fully mature as metals and chemicals are changing and evolving on a continuing basis.



Charger for lithium blower.

THE UNKNOWNS

There are also some unknowns with Lithium-ion batteries. The first is fire. You are removing the risks associated with handling a combustible liquid fuel but you are replacing that risk with the potential of dealing with the thermal runaway of a Lithium-ion battery (described later in this article).

Operating cost is another unknown. Some manufacturers will claim that the operating/maintenance cost of a Lithium-ion powered piece of equipment is close to zero. But from a repair cost perspective, repairing electrical connections can be an issue. For example, when using a backpack battery, the cable running from the battery to the implement has a finite life.

Noise generation is another consideration. Most Lithium-ion powered equipment is quieter than their gasoline powered counterpart. However, you need to be mindful of backpack blowers as they can be an issue from a noise perspective. Measuring sound is not as simple as using a decibel meter. Things like amplitude (how loud is it), duration (how long are you being exposed to the noise) and frequency (what is the pitch of the noise), need to be taken into consideration, as this can be a problem with Lithiumion powered backpack blowers.

SAFETY CONSIDERATIONS

Battery safety is an important consideration, and not just for Lithium-ion. Be compliant with your local O.H.S. regulator, perform a risk assessment and develop safe work procedures for the operation and repair of electrically powered machines. Be sure to use appropriate P.P.E. use (glasses, gloves) and remove any jewelry that you have on your hands. Rings and watches are great conductors of electricity and can make a mess if they short something while you are wearing them.





Top Photo: Charging bank lithium batteries various equipment. Bottom Photo: Larger charger lithium powered riding greens mower.

You must de-energize the equipment before you start work. Adopt the lock out/tag out procedure when working on all battery powered equipment. If the device you are working on has a key, take the key out of the device and put it in your pocket. If there is no key or master switch on the device, disconnect the battery.

Remember that when turned on, but not operating, the machine is dead quiet until you "pull the trigger". Also be mindful of electrical safety; commercial grade Lithium-ion batteries can exceed 80 volts. Under the right conditions 50 volts can stand your hair up. Golf course technicians have been around electric equipment a long time. Unfortunately, complacency can creep in. Who has propped up the seat of a utility cart only to have it fall down on the accelerator pedal and away it goes!

Lithium + H2O = boom, so keep them as dry as you can. Handle Lithiumion batteries carefully; don't drop them or throw them around. Mechanical damage to a Lithium-ion battery can trigger a phenomena known as thermal runaway, which is ultimately a fire that you cannot extinguish. The fire continues until everything in the battery is consumed. Temperatures in such a fire can exceed $2,000^{\circ}$ C.

Remember to always keep the battery charged and that cold temperatures negatively affect the characteristics of Lithium-ion batteries.

BATTERY CHARGERS (SMALL EQUIPMENT)

If you are running Lithium-Ion batteries, you need to use a battery charger that is designed specifically for Lithium-ion batteries. It is more complex than simple voltage and current. There is a software algorithm that deals with the unique charging requirements and that software interacts with the Battery Management System within the Lithium-ion battery.

You will need sufficient power for battery chargers, so do not use extension cords; plug the charger directly into a receptacle and determine the outlet capacity to ensure there is sufficient current available for the charger. Lastly, marry the battery to charger, number the batteries and number the chargers and keep them together.

PREVENTATIVE MAINTENANCE

One of the selling features that I have heard for battery powered equipment is that it is maintenance free. Nearly 50 years in the equipment maintenance field has taught me that there is no such thing as maintenance free.





Lithium powered rotary mower.

A number of years ago a version of the lead acid battery was unveiled as "maintenance free". Big, big mistake, so let's not repeat it with Lithium-ion batteries. You can expect maintenance on the following parts: battery connections, battery case condition, battery mounts, charger connections, wiring harnesses and operation of interlocks. Don't assume zero operating costs for electrical equipment (power cords are a wear item).

You will also need to consider battery storage while batteries are being transported. At my workplace, when we send staff onto the course to perform their daily tasks and they are using electric equipment, they go out with extra batteries. The extra batteries are in a carrier that keeps them from banging around and keeps them from getting too wet.

FINAL THOUGHTS

When purchasing electrically powered equipment for your golf course, know that there is a homeowners version and a commercial version. Always purchase the commercial version. Something to consider is purchasing equipment (weedies, mowers, blowers etc.) that all take the same battery. Fewer types of batteries = less hassle! **GM**



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CGSA'S WEST FALL FIELD DAY

Canmore Golf & Curling Club

Canmore, AB September 21, 2021

Registration is now open for the Canadian Golf Superintendents Association (CGSA) Fall Field Days. Due to the ongoing COVID-19 pandemic, the board is excited to introduce two Fall Field Days this year to help reduce travel and allow more participants to attend. The East event is September 14, 2021 at the Summerlea Golf and Country Club in Vaudreuil-Dorion, Quebec. Host Superintendent is CGSA President John Scott, AGS. Our Western tournament will be held on September 21, 2021 at the Canmore Golf & Curling Club in Canmore, Alberta. Host Superintendent is Reid Solodan, AGS.

If you want to attend both events, contact Barb Manifold at bmanifold@golfsupers.com or 416-626-8873 ext 25 for the coupon code and save \$50! Final details are pending COVID status and restrictions.



September 14 International Thank a Superintendent Day

Based on the success of the inaugural Thank a Super Day in 2020; we are setting our sights on September 14, 2021 as International Thank a Superintendent Day.

We are looking forward to participating with over 80 countries to recognize those who help keep the game of golf enjoyable and environmentally sustainable. Stay tuned for activities and additional information to be posted on our website at www.golfsupers.com.



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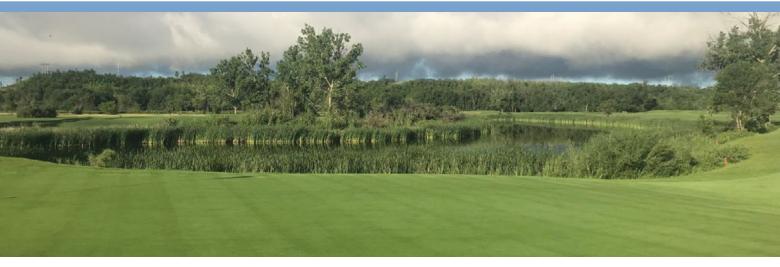
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► BACK NINE ► DARREN KALYNIUK, CGSA PAST PRESIDENT, SUPERINTENDENT, ST. BONIFACE GOLF & COUNTRY CLUB

A Recipe



Stunning 15th green at TS&M Estevan Woodlawn Golf Club.

I am very fortunate to have met many of the great people who I have written about in the Back Nine. It's safe to say that all of us have a strong passion for what we do, day in and day out no matter the challenges we are sometimes faced with, as does this next person. Allow me to introduce you to Bob Currie AGS, from the TS&M Estevan Woodlawn Golf Club in Estevan, Saskatchewan.

Bob started his amazing journey in the industry at Golf Kenosee, located in the Southeastern region of Saskatchewan in 1998. "I really liked to play golf, and my seventeen-year-old self thought this would be a great job." He continued, "I could play golf in the summer and hockey in the winter, how much better can it get."

After working a few years at Kenosee and gaining some valuable hands-on experience under Superintendent Kelvin Van Winkoop, Currie knew this was his career path.

Along the way, Bob attended Olds College, graduating with a diploma in Ornamental Horticulture majoring in Turf Management, worked a season at the Fairmont Banff Springs as a junior Tech, and returned back to Kenosee where he took on the role as Assistant Superintendent. In 2006, he landed his current position as Course Superintendent of the TS&M Estevan Woodlawn Golf Club.

With over 23 years experience in the industry Bob has seen the good, the bad and the ugly and would not change a thing. "This may sound funny, but I enjoy all the variables that the golf courses and industry have thrown at me." He continued, "Everything you do has the potential to improve or create problems down the line. I like diversity in what I do and the challenge to adapt which always keeps you on your toes. These constant changes will always prevent boredom."

Currie certainly likes to challenge himself on a regular basis including attaining his AGS Accreditation through the CGSA. "My main reason for getting my accreditation was to continue educating and pushing myself," Bob said. "I feel if you're not moving forward then you're going backwards and that there is no such thing as the status guo."

Having worked for some amazing people and courses over the years has given Currie a clearer road to success. When asked about influential people in his career, Currie mentioned that there had been many including Kelvin at Golf Kenosee and Kevin Pattison in Banff, but the most influential person was Allan Dewald. Bob explained, "Al was my assistant for several years and his quest for knowledge is second to none. Everything we worked on together just led to more intrigue and discovery."

For Success



Bobbie Currie, AGS, Superintendent, TS&M Estevan Woodlawn Golf Club.

In 2011, Bob faced one of his biggest challenges in his career with a devastating spring flood that saw as much as 7 feet of water on parts of the course and about 95% of his course being under water including their clubhouse, shops and the pumphouse.

Knowing there wasn't much they could do until water levels receded, Bob found the positives from this experience and put his best foot forward to which he said is one of his proudest accomplishments. "Once the water did recede back into the river in June, we hired Golf Design Services to help in the restoration of the front nine and the complete reroute and rebuild of the back nine." He continued, "The timing was as good as possible as we were planning to start the back nine renovation that fall anyways. It was going to be a five-year project, but we needed to rehab so why not rebuild."

Great view of the 8th green

In the end and after some extremely grueling work, they were able to reopen the front nine the following year on May 1, 2012, and the back nine on June 1, 2013. "The timeline we were able to accomplish was amazing and the product is so improved," Currie said.

At the end of the day, we can all agree that it takes a great team in all departments to be successful and I think Bob has found that recipe for success. "Our whole team deserves lots of credit, from the board through the management team and all the staff who pull everything together. Everyone at the facility strives for the same goal, to create a great experience for our guests."

With such a great team to work with, Currie can balance work and family time which is extremely important not just for his overall wellbeing but his family's too. When Bob is not at work with his trusty sidekick Belle, who has been coming to work with him almost every day for 9 years, he enjoys spending as much time as possible with his family.

"My family is amazing!" Bob said. "Jacqueline is so understanding and supportive around the sometimes crazy hours and emotional roller coaster of a golf season, and my kids Natalie and Luke, always throw some love into the grass when they come down. They are truly great kids and I love them dearly! However, as much as I like them coming to work, I love going home to see them at the end of the day." **GM**