Sports Turf Manager
FOR BETTER, SAFER SPORTS TURF. SUMMER 2016. VOL. 29. NO. 2.

Shedding Light on Athletic Field Paint and the Turfgrass Response

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Athletic fields are defined by lines and enhanced with logos. This makes painting a ritual repeated every week during the playing season for thousands of fields worldwide. Athletic paints are formulated with the intent that they will not cause harm to the turfgrass when properly applied, yet most sports turf managers have experienced some level of paint-induced damage during their career. While there is still a lot to learn about paints and painting, North Carolina State University has been testing products and application methods for several years to better understand why paints damage turfgrasses.

Before discussing paint and how it can influence turfgrass health, it may be helpful to understand a few components of paint. Athletic paints are very similar to common household paints in basic ingredients. They are generally made of four components: binder, solvent, pigment, and additives. The binder (or resin) is a film-forming component of paint that binds pigments together and allows them to adhere to a surface. The solvent in turfgrass paint is water. The pigment is an organic or inorganic particle that provides colour. Additives may be surfactants, thickeners, emulsifiers, etc. that give paint particular properties that make it easier to handle, mix and extend shelf life. Athletic paints have less volatile components than household paints and consequently there is no need for anti-microbial or algaecide components.

The opacity of the pigment in the paint that covers the turfgrass' surface alters the normal micro-climate around the plant. Although research has shown that paint may positively influence turfgrass, it routinely has the opposite effect. After repeated applications of athletic paint, we typically see a decrease in turfgrass quality, or in extreme cases, complete death. A positive influence has been noted during cooler, sunny weather when a paint-darkened surface can result in heating of the turfgrass plant which may produce limited growth enhancement. However, in most situations paint provides an additional stress. When considering the "quality" of a turfgrass, we look at the combination of turfgrass colour, cover, and density. The decrease in quality that is seen after multiple applications of athletic field paint is mostly due to a decrease in turfgrass stand density as the frequency of athletic paint applications increase.

Like most plants, turfgrasses are unable to survive without

(continued on page 6)

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President's Desk

TAB BUCKNER

Photo courtesy Jerry Rousseau

I cannot believe half the year is almost over and on June 22 our daylight hours started to decline. For all of you east of BC isn't it time to start reviewing your snow response plans?! Joking aside, we turf managers spend all of our time being creative on how to manage our sports fields so they are safe and do not affect play, on limited budgets. The best part of this time of year is to visit the sports fields you manage and observe the games being played and the fun that is being had on them.

As most of you know, the community of Fort McMurray, Alberta and its 80,000 residents were forced to flee on very short notice due to a fast moving wildfire. When I was watching the news coverage it looked like a made for TV movie. I just could not believe it was real and what those residents had to deal with. At the end of the devastation the firefighters were able to save approximately 90% of the structures in the city. The key saves where the hospital and the water treatment facility. Without the latter the firefighters would not have had adequate water supply to fight the fires and more structures would surely have been lost. Residents are now slowly returning to deal with the aftermath. It will take years for the town to rebuild but in true Canadian fashion, it will be rebuilt.

For our members and their families in Fort McMurray we are thinking about you at this time of need and for all you have suffered at the hands of the forest fire. If you have not donated already to the relief please consider doing so. Even though residents are returning they still need our help, especially those who are returning to nothing.

On May 26, Grade 9 students from Langley Senior Secondary School in Langley, BC experienced the North American debut of First Green on Sportsfields that was held at McLeod Atheletic Park. The event was a partnership with the WCTA, STC, Kwantlen Polytechnic University; Hort Department, TerraLink Inc. and the Township of Langley Parks Department.

First Green is a Seattle-based non-profit organization established to provide outdoor STEM (Science, Technology, Engineering and Math) and environmental education learning labs for teachers and students. These labs are done on golf courses or sports fields. Student groups rotated among four stations, each 30 minutes long, with a brief snack break at halftime. The four stations covered STEM aspects of physics, chemistry, biology, ecology, engineering, equipment technology and applied math. The students enjoyed the event and recommended that the organizing group should do this on an annual basis; they want to come back when they are in Grade 10!

As you have already been notified, both organizing committees are hard at work arranging all the details for the inaugural Calgary Field Day on August 25 and the 29th annual Ontario event in Toronto on September 22. The field day in Calgary is in partnership with the WCTA. Enter the dates in your calendar and plan to attend the event in your region. For all the information visit sportsturfcanada.com. ~ Tab

New & Returning Members

British Columbia

Steve Jackson
School District #6
(Rocky Mountain)
Invermere, BC

Malcolm McDougall
City of Maple Ridge, BC

David Creighton
School District 36 (Surrey)
Surrey, BC

Alberta

William Hunter
Regional Municipality
of Wood Buffalo
Fort McMurray, AB

Ontario

Kerry Whale
Allturf Ltd.
Innisfil, ON

Dean Armstrong
Vanden Bussche Irrigation
Milton, ON

Bryan Carey
Brad Jones
City of Hamilton, ON

Terry Boyd
Wray Welsh
City of Ottawa, ON

Mike Rossi
Turf Care Products Canada
Newmarket, ON

Nathan Lantz
City of Cambridge, ON

Andrew Hardy
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Harriston, ON

Mike Basile
Town of Bradford West Gwillimbury, ON

David Plant
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Guelph Turfgrass Institute
University of Guelph, ON

Ken Kron
Cameron Lawrie
Gord Murphy
University of Guelph, ON

Frank Buckley
Joe Doherty
Mary George
Andrew Lapensee
Ryan Morrison
Carmen Roberto
City of Mississauga, ON

Event Calendar

Association Events are Highlighted in Green

July
Irrigation Month
Smart Irrigation Month
Irrigation.org/resources

August 15
Ontario Turfgrass Research Foundation Fundraising Golf Tournament
Mississauga Golf & Country Club, ON
otrf.ca

August 25
Sports Turf Canada/Western Canada Turfgrass Association
Inaugural Alberta Sports Turf Field Day
Calgary, AB
sportsturfcanada.com

September 22
Sports Turf Canada
29th Annual Ontario Sports Turf Field Day
Toronto, ON
sportsturfcanada.com

October 4
Sports Turf Canada
Synthetic Sports Turf Field Safety & Maintenance Course
Olds, AB
sportsturfcanada.com

January 15, 2017
Sports Turf Manager of the Year Award Nomination Deadline
sportsturfcanada.com

For up-to-date event information visit: SPORTSTURF CANADA.com

Upon the opening of event registration, link for instant online registration, payment and confirmation.

Sports Turf Manager

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"The grass isn't always greener on the other side!" ~ Ricky Gervais

Inside this issue...

REGULAR COLUMNS, DEPARTMENTS & SMALL FEATURES

Deadline for Autumn 2016 Sports Turf Manager: September 9

SPORTS TURF CANADA.com

Correction (from Spring issue page 22)

Sports Turf Canada Elects 2016/2017 Directors

Our apologies to Dwayne McAllister who was inadvertently omitted from the announcement regarding the election of directors in the Spring 2016 issue. Dwayne is currently completing the second of his two year term.

Early evaluation of paint's influence on photosynthesis in a controlled environment

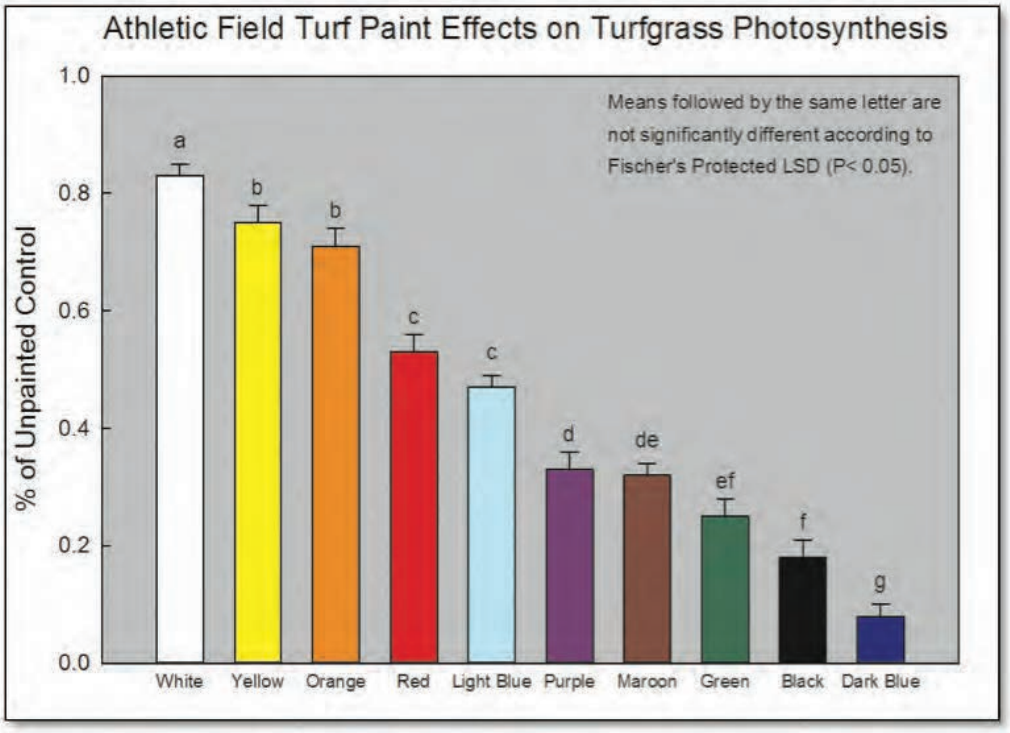
light. Light is emitted from the sun through wavelengths of particles known as photons. There are a broad range of wavelengths that determine the energy state of light that is emitted from the sun but we are only interested in photosynthetically active radiation (PAR) which is the group of wavelengths (400-700 nm) that is visible to the human eye. Most importantly, PAR is also the range of light that is used by plants. PAR is separated into three different colours of light. The 400-500 nm range is considered to be blue light, the 500-600 nm range is green light, and the 600-700 nm range is red light. So what happens when light strikes the leaf of a turfgrass plant? Light that comes in contact with the leaf surface is transmitted, absorbed, or reflected. From a plant perspective, the best scenario is to maximize the amount of light that is transmitted through the paint since that will be directly utilized by chlorophyll. PAR is separated into these different colours because when light strikes a chlorophyll molecule, it reflects these colours at their respective range of wavelengths. This is why when we look at a turfgrass plant we see the colour green. Reflected light may be partially transmitted as well, as it can be reflected to other areas of the turfgrass canopy and transmitted there. Absorbed by the paint, light can provide heat, but is largely lost for photosynthesis.

Turfgrasses use PAR to produce carbohydrates that provide energy and food storage compounds. The reaction that produces these carbohydrates is known as photosynthesis. For this light driven process to occur, plants exchange water vapour for carbon dioxide through transpiration. Photons of light excite chlorophyll molecules that are housed in the chloroplast of plants and as a result, initiate a chain of reactions that enable the turfgrass plant to capture carbon dioxide and convert it into usable forms of energy such as carbohydrates.

Before our research it was not well known how paint colours would influence light reflection, transmission, and absorbance. Our research indicated that lighter colours such as orange, yellow and white could transmit between 12 and 18 percent of available PAR while reflecting 47 to 93%. Darker colours such as blue, green, maroon, purple, and black transmitted and reflected much less (0 to 8%) while absorbing up to 95% of PAR. Our research found that much of the difference was due to the innate properties of the pigment colour and part was due to the percent of solids by volume. So the formulation and colour can impact light transmission.

A good test of these transmission results was to measure total canopy photosynthesis. This would account for the high degree of reflected light for a light-coloured paint (e.g., white paint) that may still be used in photosynthesis despite a poor transmission percentage. As a percentage, leaves that were painted white maintained approximately 80% of the photosynthesis of the non-painted. Yellow and orange was about 70%; whereas red was about mid-50s. Purple and maroon were about 40%. Dark blue and black maintained less than 20% of the non-painted. So, the shading effect of paint by colour turned out to be a very real and significant limitation to the plant.

As mentioned earlier, in addition to colour, dilution can also play a role in total canopy photosynthesis. When comparing both white and red athletic paint (diluted and non-diluted) we found that the non-diluted formulation can have a profound effect. White and red non-diluted paint decreased total canopy photosynthesis by 25% more than when it was diluted using a 1 part paint:1 part water dilution. Red, non-diluted paint decreased total canopy photosynthesis by 75%. The reduction in pigment per unit area reduces the opacity so that more light can be transmitted to the chlorophyll. While this may be beneficial to photosynthesis and plant health, diluting paint with water often reduces the brightness,



The relative influence of paint colour on turfgrass photosynthesis.

coverage, longevity, and quality of paint applications. As a result, the need for brightness and uniformity must be balanced against the effects on plant health and may vary based on a particular setting.

Without adequate photosynthesis the plant cannot maintain necessary metabolic functions. Athletic paint coating the pores (stomata) on turfgrass leaf surfaces compounds the issue. If the plant cannot freely lose water and take in carbon dioxide from these pores, then canopy temperatures can rise to become an additional stressor. The colour of athletic paint can have a great effect on turfgrass transpiration. In unpainted bermudagrass, water loss increases with canopy temperatures, but it was just the opposite with painted leaves. We typically found that the darker colours affected transpiration to a larger extent. Turfgrass coated with lighter colours such as white, yellow, and orange had similar but slightly lower transpiration rates than the unpainted turfgrass. The darker colours including red, blue, and black showed much higher canopy temperatures and much lower transpiration rates. These results mirrored what we saw with total canopy photosynthesis in that the darker coloured athletic paints have a greater negative effect on turfgrass physiological processes.

It is important to note that shading by paint pigments may not always be detrimental. Cool-season grasses grown in northern climates often do not utilize all of the light that is possible for photosynthesis. For example, ryegrasses have a relatively low light requirement and the daily light integral on athletic fields with little to no shade may be sufficient to drive adequate growth, even when accounting for shading effects by paint. Furthermore, regular use of the field and mowing may remove some of the paint from the leaf's surface. The plant will also generate new growth that is more efficient at utilizing the light. Of course, the next coat of paint may soon follow the emergence of this new growth. The result is that chronic paint use, especially darker colours, is even more damaging.

We looked at application rates and timing in relation to mowing. The results indicate that earlier removal of the paint is beneficial to the plant. We found that one less mowing during the week provided faster recovery. Although a higher frequency of mowing would suggest that more of the paint is being removed from the turfgrass leaf blade, the area of the plant that is not coated with paint (new growth) is also being mown off. Allowing new tissue that is not coated with paint an extra day to expand will increase the leaf area that is able to actively photosynthesize and as a result, promote faster recovery. The timing of athletic paint application had a greater effect on the quality of the painted surface compared to recovery of the turfgrass over time. As expected, earlier applications of paint were of reduced quality compared to applications made later in the week (closer to "gameday"). Furthermore, we found that paint applications made earlier in the week may minimally increase turfgrass recovery, but not to the degree that would merit sacrificing the overall appearance of the paint application. As mentioned before, an athletic field manager may need to balance plant health and quality of paint appearance.

Also some limited work on binder concentrations looked very promising for alternative formulations that would be less damaging. Remember that binder is the ingredient in paint formulations that is responsible for the paint's ability to adhere to the leaf blade, so manipulating the concentration of binder can affect how long the paint will "stick" around. One issue that must be addressed when looking at alternative formulations in terms of binder concentration, is the susceptibility of the paint to transfer onto an absorbent material, i.e. an athlete's uniform. This can be very problematic as this may result in increased staining of uniforms. The severity

Field day demonstration of colours used in paint research using the Atlantic Coast Conference (ACC) school colours

of this issue may be anywhere from a minor laundry matter or as severe as a need for total uniform replacement.

The painting of athletic fields is a ritual that has evolved tremendously as sports have become more and more popular over the years. Not only are athletic paints needed for boundary lines and other field markings for playability of the game, paints are also needed for advertising logos and brand marketing. Logos may not be required for successful completion of a sporting event, but at the time of high-definition television and major companies seizing opportunities to market their brand, athletic field painting will continue to be a major part of athletic field management. We have identified some of the underlying negative effects that athletic field paint has on natural turfgrass surfaces. While there is not much likelihood of teams changing their colours to help minimize turfgrass decline, there are ways to help combat the harmful effects. •

School painted logo at football stadium.

Painted turfgrass in pots to evaluate influence of dilution

Complexities of Soil Organic Matter Made Simple

Paul Voroney, Ph.D., Professor, School of Environmental Sciences, University of Guelph

What is soil organic matter?

The organic matter in both natural and engineered "soils" constructed for turf sports fields, putting greens and fairways consists of plant, faunal, and microbial residues in various states of decay - from fresh litter to humus. Grass growing on these soils is the original source of this organic material, and overtime these residues are consumed by the organisms living in the soil and decomposed (Figure 1).

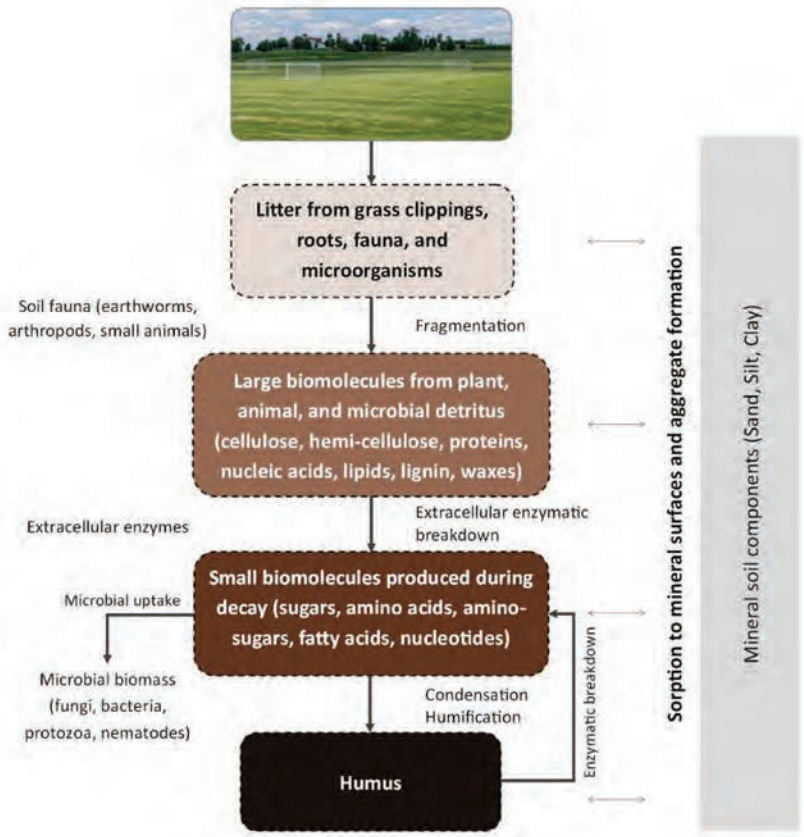


Figure 1 *(photo courtesy of P. Nowell)*

Because it is difficult to separate the components of living organisms from the by-products of their decay or to isolate organic matter separate from the mineral particles (sand, silt and clay), the precise chemical nature of soil organic matter is far from being completely understood. Indeed, soil organic matter is considered by soil scientists to be the most chemically complex organic material on earth.

About one-half to two-thirds of the soil organic matter is comprised of physically (leaf, root and other cell tissues) and

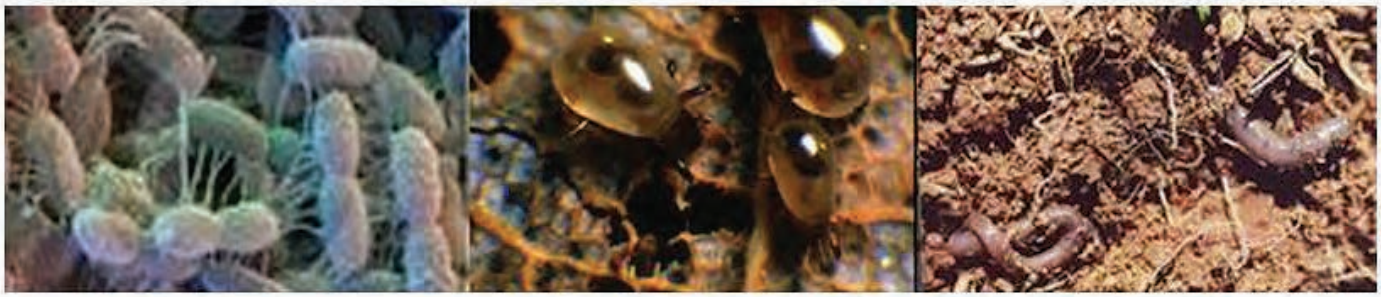


Figure 4

chemically recognizable structures derived from the decomposing grass and from the organisms responsible for its decay. These compounds make up the tissue of organisms and include cellulose, hemicellulose, proteins, lipids, lignin, and waxes, among others. The remaining organic matter is termed humus, and is dark brown- or black-coloured. Despite being a product of decay, the chemistry of soil humus is not known, even though it has been studied for hundreds of years. Together these organic matter constituents benefit soil physical, chemical and biological properties.

How much organic matter do turf soils contain?

Turf soils typically contain from 1 to 5% soil organic matter in the top 15 cm (Figure 2). The amount of organic matter depends on the parent material used in the construction of the turf rootzone, the age of the field, and how the surface soil is managed. Assuming a 4% soil organic matter content for a mature site, this is equivalent to ~1000 kg/100 m^2 of soil organic matter. To put this in perspective, 1000 kg of soil organic matter contains 550 kg of organic carbon, 55 kg of organic nitrogen and 5.5 kg of organic phosphorus - a very significant carbon sink and very rich nutrient pool indeed! From a management perspective, levels of soil organic matter are controlled by coring and topdressing, preferably with a sand specification that is compatible with the rootzone construction. Dilution with topdressing sand is the solution for maintaining a healthy rooting zone and optimal pore size distribution.

In both sand construction and natural soils total porosity is ~50% of the soil volume, with organic matter playing a critical role in the maintenance and distribution of the pore size. Adequate macropore space (pores greater than 10-50 μm diameter) is critical for proper aeration, water infiltration and drainage, as well as for root growth. Micropore space, or capillary space, is important for water retention and ideally should be between 15 and 25%.

In putting greens and sports fields constructed from sand, optimal pore size distribution is defined with the use of USGA specifications. These soils are amended with peat (10-25% by volume) during the initial construction to ensure stable pore space and to resist compaction. In soil construction, total pore space is determined by the soil's texture (sand, silt and clay content) and organic matter content. Soil organic matter builds up over 5-10 years as grass litter decomposes and humus is formed. In natural soils these processes promote aggregation of the mineral particles (Figure 3).

In sand-based rootzones the accumulation of organic matter increases retention of available water for plant growth. However, it is specifically the accumulation of humic substances that enhance the soil's nutrient retention characteristics, including cation exchange capacity and buffering capacity (a soil's ability to resist changes in soil pH).

Soil food web

Soil organic matter provides energy and nutrients to support a large, diverse population of soil organisms - the basis of "soil health". Such a biological soil community is essential for decomposing the plant litter and releasing plant nutrients from soil organic matter - nature's recycling plant, and it is also critical for resisting infestations of soil-borne plant pathogens and in promoting beneficial organisms

Figure 2 *(photo courtesy of P. Nowell)*

Figure 3 *(photo courtesy of P. Nowell)*

that stimulate root growth. Soil fauna, such as mites, colembola and earthworms (Figure 4), tear apart the plant tissues and mix it with the soil. During this process the plant residues become inoculated with microorganisms which are largely responsible for the breakdown and subsequent biochemical transformations of the litter.

Can there ever be too much soil organic matter?

When the numbers and diversity of the organisms in the soil biological community are low, such as in newly constructed soils deficient in organic matter or in those made of pure sands, grass litter and thatch can accumulate at the surface to form a thick mat (Figure 5). Because grass leaves have a waxy coating, they are hydrophobic and act to block water infiltration and this can become a serious issue during irrigation. Again, coring and sand topdressing helps to alleviate this problem.

Another problem arises when excessive organic matter accumulates in the rooting zone and forms a thick black layer rich in humus (Figure 6). This layer can restrict water drainage and reduce essential aeration for plant roots. Its formation occurs under more moist conditions, such as during excessive irrigation coupled with a shallow rootzone, which promote the formation of soil humus. It is the amorphous nature of humic substances that causes soil pores to clog. Several factors can cause black layer formation, so it is essential to review management practices that might regulate plant growth and rootzone moisture levels. In particular, rates of fertilizer application and irrigation frequency can either promote or hinder the accumulation of soil humus. Coring and topdressing with compatible sand will improve macroporosity thereby helping to enhance aeration and drainage.

The organic matter in turfgrass systems can benefit all of the soil's chemical, physical and biological properties. However, like Goldilocks, the amount and nature of the organic matter in the surface soil needs to be managed - not too little or too much, just the right amount. •

Figure 5 *(photo courtesy of P. Nowell)*

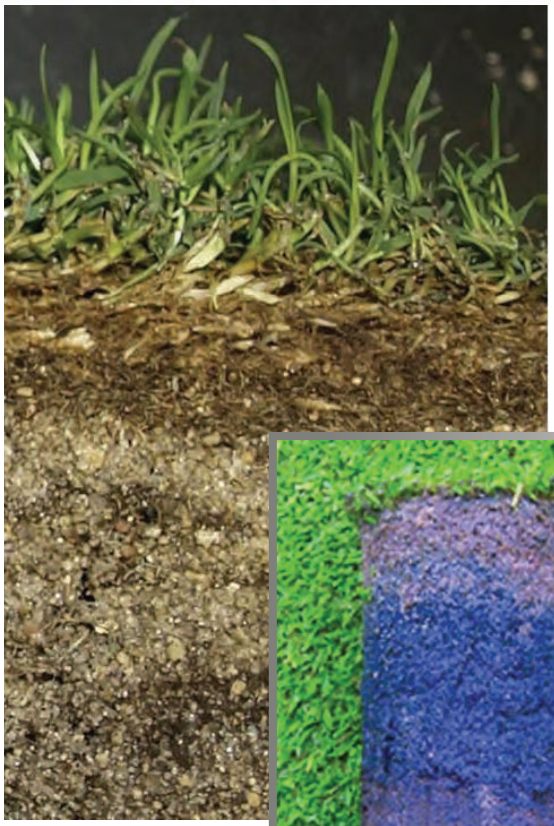


Figure 6
(Photo courtesy of GTI)

(Photo courtesy of STRI)

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FIRST GREEN ON SPORTSFIELDS A HIT

Doug Speranza compares fertilizers

Brad Waters shows irrigation components

Dan Allen and Tab Buckner discuss topdressing

Stan Kazymerchyk, Western Canada Turfgrass Association

On May 26, Grade 9 students from Langley Secondary School (LSS) in British Columbia experienced the North American debut of First Green On Sportsfields.

First Green is a Seattle-based non-profit organization established to provide outdoor STEM (Science, Technology, Engineering and Math) and environmental education learning labs for teachers and students. These labs are done on golf courses or sports fields. The Western Canada Turfgrass Association (WCTA) is First Green's authorized organization to promote First Green's trademarked programs, training and field trips in Western Canada. WCTA initiated the Canadian premiere of First Green at Vancouver Golf Club and Redwoods Golf Club. Turfgrass managers and golf course superintendents interested in potentially hosting a First Green event can contact Stan Kazymerchyk at stan.kazymercyk@kpu.ca.

This inaugural event used the resources of Township of Langley sports fields/staff/equipment, Kwantlen Polytechnic University Turf Management staff/equipment, TerraLink Horticulture staff and WCTA guidance. Initial LSS teacher input was critical to aligning school learning needs and levels with topics and level of instruction.

Student groups rotated among four stations at Macleod Athletic Park adjacent to Langley Secondary School. Stations were 30 minutes long, with a brief snack break at halftime. The four stations covered STEM aspects of physics, chemistry, biology, ecology, engineering, equipment technology and applied math. Our teachers did a great job of blending basic theory with technology demonstrations and hands-on student activity.

Brad Waters of Township of Langley conducted the irrigation station. Brad showed students components, controls, physics and math of turf irrigation. He set up a sample system demonstrating everything from moisture evaluation to controls to sprinkler output.

Doug Speranza of TerraLink Horticulture went over turf fertility. Doug discussed soil chemistry, turf nutritional needs, fertilizer performance and applied math. Students examined real soil tests, analyzed fertilizer makeup and performed application math.

Dan Allen of Township of Langley covered the cultural processes of aeration, topdressing and overseeding. This included the physics of soil, water,

Rob Welsh conducts backpack blower race

air and compaction; sand topdressing purposes and needs; and the ecosystem dynamics of overseeding. This station also featured live demos of aeration, dethatching, topdressing and overseeding.

Rob Welsh of Kwantlen demonstrated the mechanics, physics and safe use of powered backpack blowers. He showed students a cutaway engine block and went over all aspects of blower operation. Rob fitted them with safety gear and had students navigate a fun obstacle course propelling coloured ping-pong balls in a race.

"This was a great opportunity to see kids apply their math and science skills to this type of an approach, and let them know there are all kinds of opportunities out there in this area for future employment," said Gord Stewart, Acting Superintendent of Schools for Langley School District #35.

"With the importance of outdoor recreational opportunities in urban settings, turf management is a growing industry," said Township Manager of Parks Operations and Sports Turf Canada President Tab Buckner. "Sports fields are a major part of our community's health and well-being. This was an opportunity to work with young people and give them some insight into how we manage these important and busy facilities. There is a lot involved in sports field maintenance, but it can be a really rewarding career. We were really pleased to be able to give these young people a hands-on, on-site experience."

"Any chance I can get to bring my students outside the classroom where they can apply science and math and do hands-on things" said LSS teacher Alyssa Pagnanini, "They had a great time and did math today without me pushing!"

Rob Welsh of Kwantlen commented, "What a great opportunity to bring the turf industry to a group of interested and energetic students. Every student that I worked with today was interested in the topic on blowers and had some great insight on the issues, benefits and value for the blowers in turf maintenance and I think they had fun as well. Getting young people interested and exposed to a trade early on in their education is so important as we look forward. This event allowed a group of students to meet the people in the turf industry and allows those same people to pass on their energy and passion. If anything, I feel that I had a chance today to give the students an experience that maybe they will look back on when they are making that decision about where they might go in a career and think back on the day and maybe they can say 'maybe that is for me.'"

"This was lots of fun," said one of the students, "We learned a lot about turf science. I would definitely do this again and recommend this for other classes." Kwantlen Turf Management instructor and WCTA First Green coordinator Stan Kazymerchyk added, "This event confirmed that sports field management is logistically an ideal way to convey First Green's message. Sports fields are usually adjacent to schools, with skilled staff and equipment easily mobile. Students have a natural curiosity about turf management since they see our operations on a daily basis. This session gave these students an appreciation of our profession from a sports field user's perspective and a great preview of the turfgrass management world as a potential career." •

Predictive Maintenance = Near-Zero Downtime

Eddie Konrad

BECAUSE SUPPLIERS ARE pushing their production equipment for every ounce of capacity, a strong emphasis has been put on the importance of quality maintenance services. Service and maintenance are becoming essential to sustain healthy turf and customer satisfaction at the highest possible level. The importance of maintenance functions, and therefore of maintenance management, has grown tremendously.

Equipment managers should apply maintenance technologies that aim to increase machine reliability and reduce downtime, increase life expectancy of organization assets and improve safety and quality conditions.

There are five approaches to maintenance:

NO MAINTENANCE will occur because the maintenance technique is not available for some special application, or it's not worth it to fix it comparing cost. It might be more cost-effective just to discard it.

REACTIVE MAINTENANCE is "fixing it after it's broken," since most of the time a machine breaks down without warning and it is urgent for maintenance to put it back to work. The reason reactive maintenance happens is due to little attention through the years to proper care of machinery. Essentially, little to no maintenance is conducted and the machinery operates until a failure occurs.

PREVENTIVE MAINTENANCE is a strategy based on replacing, overhauling or remanufacturing an item at a fixed interval, regardless of its condition. Minor PM is basic maintenance, which is simply the act of performing the most fundamental equipment service – lubrication, cleaning, routine adjustments, etc. – essential to assuring continued operation of the equipment. Major PM includes minor PM, but also addresses potential failures. Equipment is scheduled to be out of service so more involved tasks can be performed. Based on run-hours or some equivalent time factor, components such as bearings, shafts, sensors, gears, piping, etc., are replaced in anticipation of potential failure.

PREDICTIVE MAINTENANCE is a right-on-time maintenance strategy. It may be best described as a process which requires technologies and people skills, while combining and using all available diagnostic and performance data, maintenance histories and operator logs to make timely decisions about equipment. The key concepts are combining all information, analyzing information for equipment degradation, determining a corrective action, determining when to take corrective action and being proactive.

PROACTIVE MAINTENANCE, in general terms, encompasses any tasks used to predict or prevent equipment failure. To be specific, there are two working directions. Proactive maintenance focuses on analyzing the root cause and not just the symptoms. It seeks to prevent or fix the failure from the source after it identifies the root cause.

Reactive maintenance performed only when equipment fails results in both high production costs and significant service downtime. Preventive maintenance is intended to eliminate machine or process breakdowns and reduce downtimes by scheduling maintenance operations regardless of the actual state of a machine or process. Preventive maintenance intervals are determined using reliability theory and information about the machine or process life cycle.

continued on page 18

Raising the Standard in Line Marking

✓ Easy
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With the iGO machine and Impact XP Paint, line marking has never been easier, more efficient or economic. Impact XP Paint is ready to use and with as little as 1.2 litres you can over mark a soccer pitch.

WHY THE iGO IS UNIQUE

THE NOZZLE: A specially engineered nozzle has been developed to match the desired atomization characteristics of the Impact XP paint. The integration of paint formulation with nozzle design and performance is a major advance in sports marking application.

AN ENVIRONMENTAL LANDMARK IN PAINT TECHNOLOGY

The Impact XP line marking paint is the most advanced, ready-to-use line marking paint and raises the standard of sports field line marking. No mixing, measuring or dilution of the paint is required as the paint is applied direct from it's container WITHOUT the addition of any water.

Impact XP is a highly micronized formulation of titanium dioxide, combined with special binders, providing unequaled coverage. A standard sized soccer pitch can be over-marked with as little as 1.2 litres of Impact XP.

The fine atomization of the spray droplets ensures the paint adheres strongly to both sides of the leaf blade. Special pigmentation attributes provide a bright, white reflective surface increasing in visual intensity as the paint dries to give an exceptional line.

In addition, the formulation offers a high level of rainfastness that is durable under a wide range of climatic and ground conditions. Under normal conditions the paint is surface dry within 10 minutes.

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This practice often results in unnecessary loss of productivity either because maintenance is performed when the process or machine is still functioning at an acceptable level, or because unpredicted breakdowns occur before scheduled maintenance operations are performed. These inefficiencies are the result of maintenance performed in accordance with a schedule (fixed and guess work) as opposed to the machine's true condition and need (flexible and dynamic). So even if we have already achieved a nearly perfect preventive maintenance level, its cost still represents a sizeable portion of the total operating expenses and leaves a lot of room for improvement and cost savings.

The benefits of predictive maintenance are many.
It improves productivity by minimizing or eliminating costly downtime. It reduces unscheduled maintenance because repairs can be made at times that least affect schedules. It optimizes machinery performance. It reduces time required to make machinery repairs, because advance notice of machinery condition permits more efficient organization of the repair process. It reduces overall costs because it reduces unnecessary machinery repairs. It reduces spare parts inventories. It reduces depreciation of capital investment caused by poor machinery maintenance. It reduces excessive fuel consumption by inefficient machinery performance. And it reduces the need for standby equipment or additional floor space to cover excessive downtime.

The advantages don't end with saving money on fuel and energy requirements and capital investment required for equipment. Predictive maintenance also leads to better relationships between equipment managers and turf managers by reducing the number of dissatisfied users due to poor turf quality. It increases machinery safety by reducing injuries caused from poorly performing machinery and safety penalties against the organization for unsafe machinery, which thereby reduces insurance rates.

In order to implement predictive maintenance technology two investments must be considered – investment in condition-based monitoring/diagnostic equipment and investment in training of staff. •

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Provide Your Pitchers with Solid Footing

Jeff Langner, Turface Athletics

The pitcher's mound receives more abuse than any other area on a baseball field. Properly building and maintaining the mound is critical to the safety of players and the performance of the field. If you're responsible for the upkeep of your field, there are products and tools that can help you provide a solid, long-lasting pitching surface for your athletes, while minimizing the amount of repair required after each game.

Following is an overview of several product options for mound construction and repair, along with step by step instructions for renovating an existing mound (or batter's box area – an equally important, yet challenging area of the field to maintain!)

Several manufacturers supply bagged clay that is a specialized shredded material that is much higher in clay content than a typical infield mix. The level of silt and clay, for example, might be 80% or higher, with only 10 to 20% sand in the mix. This allows the material to have a high binding quality and strong durability.

Because the clay content is so high, however, the materials can be challenging to maintain from a moisture standpoint. When the clay gets wet it can be slippery or sticky – thus it is beneficial to have a tarp on hand for rain events, and a good calcined clay conditioner to protect the clay and provide sure footing during rains. In contrast, in hot, dry months the clay can dry out, harden, and crack if a field manager isn't able to add water and keep the surface covered.

With these inherent challenges in the professional clays, field managers who have recreational facilities and/or manage multiple fields will sometimes turn toward mound clays that have a higher sand content and are thus more forgiving. An All-Purpose Clay is one product, for example, that is manufactured by Turface Athletics that is closer to 40% sand content and has a silt and clay content of about 60%.

This product is more similar to an infield mix but has enough silt and clay to bind and pack for a mound or batter's box. The bagged clays from Turface also feature optimum moisture in the bag for easy application without much up-front preparation. This moisture helps greatly with the installation process.

A few of the professional mound clays on the market also come in a pre-formed block or clay brick that helps to save labour in the construction or renovation process. Turface MoundMaster® Blocks for example, are made from the same raw clay found in bags of their Professional Mound Clay. The MoundMaster Blocks are hydraulically packed blocks, measuring 2 ½" (6.3 cm) thick; eight inches (20 cm) long, and four inches (10 cm) wide to help lay the perfect foundation around home plate in the batter's and catcher's boxes. They are packaged in 8-block sealed baggies for easy storage and long durability, and come out of the baggie pliable and ready to work.

Whether one uses the bagged material or pre-formed blocks, following are some installation instructions that are helpful for field managers to follow.

Easy Steps to Safe and Durable Pitching Mounds and Batter's Boxes

Tools required: tamp, rake, shovel, broom, watering can, and a slope board for the mound.

Excavate the front slope of your mound to a 4" to 6" (10 to 15 cm) depth. Batter's boxes and catcher's box to a 4" depth.

Moisten the bottom of the hole with water. Add an inch (2.5 cm) of mound clay with a rake, cut into the soil for proper bonding. Tamp firmly. Lightly moisten but do not drown, and tamp again.

Evenly add an inch of new mound clay to the area you are working. Tamp until firm. Water the area, but do not drown. Repeat. As you near the last layer, reduce the amount of water you add to the mound clay.

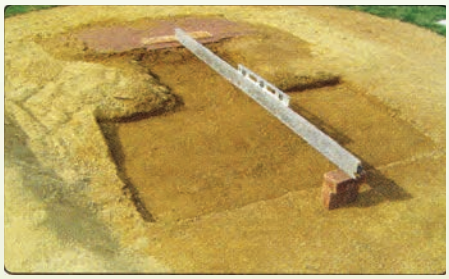
As you reach the top of your mound clay area on the mound, use a rake to rough grade the slope in front of the mound. Tamp or roll the slope for a smooth surface. Add mound clay to any low spots and use your rake to cut down the high spots. After leveling, tamp or roll again.

Add a final coating of water on the mound clay areas once all grades and slopes are set and rolled. Finally, topdress all mound clay areas with your infield mix and infield conditioner to match the colour of your infield.

Installing With Blocks

When installing clay blocks, it is important to study your pitchers. Place the blocks 10 inches (25 cm) before the shortest stride and 10 inches wider than the longest landing foot. Remember pitchers may pitch from either edge of the rubber. The entire table around the mound should be built with clay blocks.

Outline your landing areas and plateau using a mound gauge to obtain the desired slope. Excavate 3" (8 cm) below the surface. Level and tamp firm.



Excavate the landing area and be 10" (25 cm) wider and longer than the longest stride of your pitchers. Blocks should be within 1/2" (1.3 cm) of the surface.

Wedge the blocks into position 1/2" below the rubber.

Fill around blocks with adjacent soil and tamp to wedge together.

Tamp and water thoroughly several times for about an hour. Allow water to be absorbed into clay so blocks swell. Tamp firmly between watering.

Apply a thin layer of mound clay (match colour to blocks), moisten and tamp.

Rake mound clay and infield mix over the surface and hand drag.

To repair holes, cut up blocks or use mound clay. Before repairing, sweep out hole to expose pure packing clay. Moisten exposed packing clay, then add repair clay.

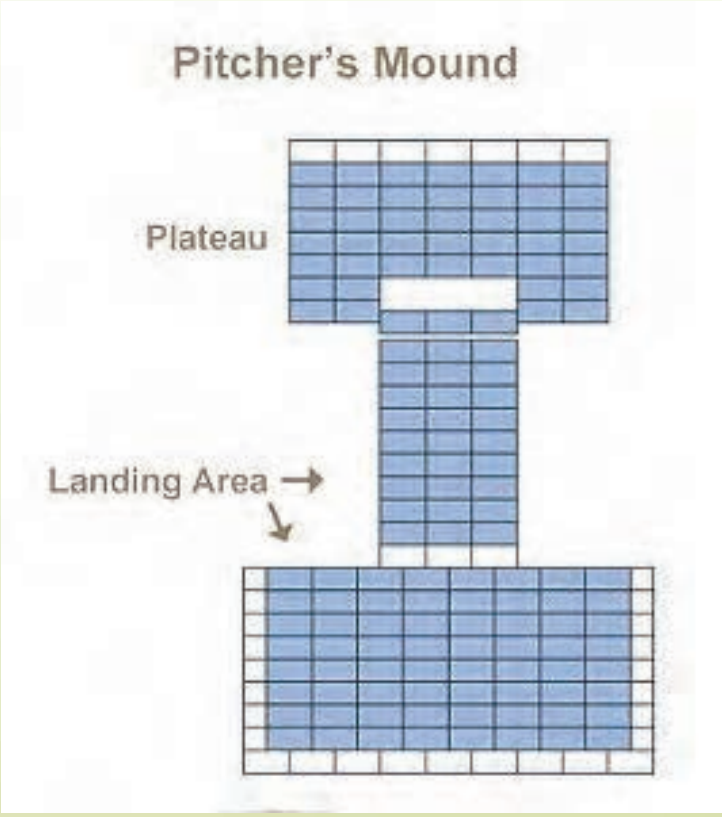
Cover your mound with a plastic tarp to hold moisture.

Condition the Pitcher's Mound

1. Once the entire mound has been rebuilt, spread one or two bags of infield conditioner to lightly cover the mound. This can be done with a landscape rake. The infield conditioner helps keep the pitcher's mound moist without being slippery.
2. Lightly moisten the mound.
3. Roll the mound with a hand roller, if available.
4. Cover the mound with tarp. The tarp is essential to prevent your mound from drying out and from washing into the turf.

Jeff Langner is Brand Manager, Turface Athletics

For an instructional video on building a mound or batter's box with Turface MoundMaster Blocks, visit www.turface.com/resources/article/improving-pitchers-mound-footing



Baseball/Softball Field Safety and Maintenance Checklist

Pitcher's Mound

Yes	No/Needs Attn	
☐	☐	The mound conforms to league requirements.
☐	☐	Platform area behind the rubber is large enough.
☐	☐	"Push off" and "landing" areas are constructed with specialized clay.
☐	☐	"Push-off" and "landing" areas are not dished out and in need of repair.
☐	☐	There is not a hazardous soil buildup (lip) between the mound and the infield grass.

Playing Surface

Yes	No/Needs Attn	
☐	☐	Maintenance equipment, such as rakes, hoes, etc. have been removed from the field.
☐	☐	Litter and unsafe debris have been removed from the field and player/spectator areas.
☐	☐	The sprinkler heads should be installed as per manufacturer's recommendations with no protrusions on the playing surface.
☐	☐	If there is an irrigation system, it is timed correctly to irrigate the appropriate amount of time prior to play.
☐	☐	The field was constructed according to recommended industry specifications.

General

Yes	No/Needs Attn	
☐	☐	There is a flag or other signaling system to alert players to leave the field if inclement weather or other danger is imminent.
☐	☐	Skinned foul lines are in good condition.

Skinned Areas

Yes	No/Needs Attn	
☐	☐	The soil is not too loose and provides good running traction.
☐	☐	The soil surface is loose enough around sliding zones for safe sliding.
☐	☐	The soil is not too abrasive for safe sliding.
☐	☐	The soil is not too compacted to provide good drainage.
☐	☐	Running paths and sliding zones near bases are level and not worn.
☐	☐	Batter's box and home plate areas are in good condition.
☐	☐	Pitcher's mound is in good condition.
☐	☐	The skinned area is level and does not have low spots or holes.
☐	☐	There is no hazardous soil buildup (lip) between the skinned area and the turf.
☐	☐	The skinned area is dry.
☐	☐	When moist, the skinned area is not too sticky and does not adhere to shoes.
☐	☐	Coach's box is level with surrounding area.
☐	☐	Coach's box is not excessively hard.
☐	☐	On-deck or walkway from dugout is not excessively hard and compacted.
☐	☐	Unsafe obstacles such as hard gravel and framing boards do not exist in on-deck or walkway areas from dugouts.

Yes	No/Needs Attn	
☐	☐	Areas that are hazardous or under repair have been blocked off or identified.
☐	☐	The chalking material is not irritating to eyes.

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Turf Areas

Yes	No/Needs Attn	
☐	☐	There is at least 75 percent coverage of turfgrass on the field.
☐	☐	There are no bare spots with a hard soil surface exposed.
☐	☐	Soil is well drained with no standing water.
☐	☐	Turfgrass is uniform in colour, height and density.
☐	☐	Turfgrass has strong root system, limiting "blow-outs."
☐	☐	There are no weeds with thorns, bristles or burrs.
☐	☐	There are no holes or mounds made by moles, gophers, or other animals.
☐	☐	There are no ruts or trenches caused by equipment use or field wear.
☐	☐	There has been communication between the maintenance staff and coach/facility user.

Fencing *(skip if your field does not have fencing)*

Yes	No/Needs Attn	
☐	☐	Fences are securely set in the ground.
☐	☐	Fence posts are outside of the playing area.
☐	☐	There are no concrete footings exposed above ground.
☐	☐	Fencing is securely attached to its posts.
☐	☐	There are no large gaps in the fencing or between the ground and the fence.
☐	☐	Top and bottom tension wires are in place to secure the fence.
☐	☐	The wire ends of the fence are not exposed at the top or corners.
☐	☐	There are no damaged areas that protrude, are sharp or loose.

Lighting *(skip if your field does not have lighting)*

Yes	No/Needs Attn	
☐	☐	Installed/inspected by a trained engineer or technician meeting industry recommended specifications and the light's beam adequately and uniformly covers the field.
☐	☐	All lights are working.

Bleachers/Facility *(skip if your field does not have bleachers/facility)*

Yes	No/Needs Attn	
☐	☐	Nuts and bolts are tight with none missing
☐	☐	Guard rails are securely in place.
☐	☐	The plank or railing end caps are securely in place.
☐	☐	There are no splinters or worn areas (wooden bleachers).
☐	☐	There are no harzardous protrusions or sharp edges.
☐	☐	The supply and location of waste cans is adequate.
☐	☐	There is appropriate signage notifying players and spectators of rules, appropriate behaviour and deficient conditions.
☐	☐	There are public telephones or a staffed office for emergency situations.
☐	☐	Areas under repair are identified and posted appropriately.

Bases and Anchoring

Yes	No/Needs Attn	
☐	☐	Base coverings do not have unsafe rips or gouges.
☐	☐	Base framework or hardware is not loose or damaged.
☐	☐	The base ground stake is safely below the surface grade.
☐	☐	The base ground stake is firmly secured in its concrete footing.
☐	☐	The base, ground stake and its footing are installed according to the manufacturer's requirement.
☐	☐	The bases seat properly with the ground elevation and are seated securely.
☐	☐	The concrete footings will not twist out of place in the ground.
☐	☐	The surface of home plate is level with the surrounding surface.
☐	☐	The pitcher's rubber is level with the surrounding surface and is secured safely in the ground.

Sports Turf Canada Announces 2016 Sports Turf Manager of the Year - Greg Lampman

Photo credit: Howie Kumagai

The Sports Turf Manager of the Year award, sponsored by the Guelph Turfgrass Institute (GTI), is a prestigious honour which recognizes an individual's professional ability and contribution to the Canadian sports turf industry and shows appreciation for his or her proactive and progressive efforts within the profession.

Mr. Lampman is a Sports Field Operator with the Town of Oakville overseeing 13 Class A fields and seven Class B fields. Two of the Class A fields are all-weather turf. He leads a crew of four summer staff and is responsible for the safe and efficient operation of his team.

"Greg personifies professionalism in the sports turf industry through dedication, continuous improvement, research and enthusiasm," said Jane Arnett, the Town's Senior Manager of Operations, Parks and Open Space.

Greg facilitated the open communications and dialogue that was required to manage a challenging situation affecting user groups with the closure of a premier field. As a result of the second consecutive hard winter for turf, Greg deemed the conditions of the field unplayable. Furthermore, unpermitted use jeopardized the field's renovation. Through Greg's efforts an agreement was reached with all stakeholders resulting in the realization of better, safer sports turf. "Greg is committed and takes the quality of his turf very personally," added Ms. Arnett.

"Greg's unwavering commitment to effective communications is one of the key pillars to his success. It is because of his understanding and the sharing of his knowledge and expertise with all stakeholders that Sports Turf Canada recognizes him with this honour," STC President Tab Buckner explains.

The nomination deadline for the 2017 Sports Turf Manager of the Year is January 15.
Visit sportsturfcanada.com for eligibility, criteria and the nomination form.

Alberta and Ontario

Sports Turf Field Days Announced

The Western Canada Turfgrass Association (WCTA) and Sports Turf Canada (STC) have announced they will be partnering to present the first Alberta Sports Turf Field Day **Thursday, August 25 at Ralph Klein Park and New Brighton Athletic Park in the City of Calgary.** The inaugural event, will provide a first-class educational and networking opportunity for professional sports turf managers from across western Canada.

The Ontario Sports Turf Field Day returns to the City of Toronto and Centennial Park on Thursday, September 22, 2016. This city venue hosted the new association in 1988 for what was then a fledgling endeavour, laying the foundation for what has become a flagship event, now in its 29th year.

Visit **sportsturfcanada.com/events/event calendar** for all the details as they become available.

Centennial Park Toronto

Public Health Reminder: Lyme disease

Why you should take note.

Original document available at: www.phac-aspc.gc.ca/phn-asp/2015/lyme-eng.php

Lyme disease is a serious illness that is present in Canada and spreading. Canadians at risk from Lyme disease include those, who live, work and/or play in close proximity to ticks that spread the disease.

If not identified and treated early, Lyme disease can cause serious health issues. But there are simple and effective measures you can take to protect against it.

As you prepare to spend time outdoors, learn more about Lyme disease and how to prevent it.

What is Lyme disease?

Lyme Disease is a serious illness which can be spread by the bite of infected blacklegged ticks.

How to remove a tick

1. Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible.
2. Pull upward with steady, even pressure. Don't twist or jerk the tick; this can cause the mouth-parts to break off and remain in the skin. If this happens, remove the mouth-parts with tweezers. If you are unable to remove the mouth easily with clean tweezers, leave it alone and let the skin heal.
3. After removing the tick, thoroughly clean the bite area and your hands with rubbing alcohol, an iodine scrub, or soap and water.
4. Dispose of a live tick by submersing it in alcohol, placing it in a sealed bag/container, wrapping it tightly in tape, or flushing it down the toilet. Never crush a tick with your fingers.

Risk to Canadians

While not all blacklegged ticks carry Lyme disease, populations of infected blacklegged ticks are growing. This means that the risk of contracting Lyme disease is on the rise across Canada.

Blacklegged ticks can be active throughout much of the year; however, your risk of a tick bite is highest in the spring and summer months.

People can come into contact with ticks while participating in outdoor activities, such as golfing, hiking, camping or gardening. Contact occurs when people and animals brush up against the vegetation found in forests and the overgrown areas between the woods and open spaces.

Take steps to reduce your risk if you spend time outdoors in areas where there may be ticks. As ticks are very small and their bites are usually painless, you may not know you've been bitten, so it's important to be on the lookout for ticks and the symptoms of Lyme disease.

Where are ticks found?

Blacklegged ticks are most often found in forests and the overgrown areas between the woods and open spaces. They are most abundant in the following locations:

Southern British Columbia
Southeastern and south-central Manitoba
Southern, eastern and northwestern Ontario
Southern Quebec
Southern New Brunswick and Grand Manan Island
Parts of Nova Scotia

Ticks don't move far by themselves but they can attach to migratory birds, and may fall off far from their original location. For this reason, it's possible to find infected ticks in other areas than the ones listed above. Surveillance is ongoing to confirm other areas of spread.

How to protect yourself

Canadians are encouraged to spend time outdoors, be active, and to remember to protect themselves against tick bites by taking these simple steps:

- Wear closed-toe shoes, long-sleeved shirts and pants
- Pull socks over pant legs to prevent ticks from crawling up legs
- Wear light-coloured clothes to spot ticks easier
- Use insect repellents that contain DEET (active ingredient to keep bugs away) or Icaridin. Repellents can be applied to clothing as well as exposed skin. Always read and follow label directions
- Shower or bathe within two hours of being outdoors to wash away loose ticks
- Do a daily "full body" check for ticks on yourself, children and pets
- If you find a tick on your skin, removing it within 24-36 hours of the tick bite usually prevents infectionExternal site

Symptoms

Initial symptoms differ from person to person, which makes Lyme disease very difficult to diagnose. Some people may have no symptoms at all. Others may experience mild symptoms like fever or a skin rash soon after being bitten, while others may suffer severe symptoms, but not for weeks after the bite.

Symptoms of Lyme disease can include one or a combination of the following with varying degrees of severity:

Fatigue
Fever or chills
Headache
Spasms, or weakness
Numbness or tingling
Swollen lymph nodes
Skin rash

Additional symptoms can include:

Cognitive dysfunction (brain fog) or dizziness
Nervous system disorders
Arthritis and arthritic symptoms (muscle and joint pain)
Abnormal heartbeat

Untreated, symptoms can last months to years. They can include recurring arthritis, neurological problems, numbness and paralysis. Although not common, fatalities from Lyme disease have been reported.

If you develop symptoms of Lyme disease, contact your health care provider right away, as the earlier you receive a diagnosis, the greater the chance of a successful treatment. If you saved the tick that bit you, bring it with you to your medical appointment. It may help the doctor assess your illness. •

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