

Sports Turf Manager

FOR BETTER, SAFER SPORTS TURF. SPRING 2012. VOL. 25. NO. 1.

Climate Change & Turfgrass

Jonathan Newman, Professor and Director, School of Environmental Sciences, University of Guelph

Climate change used to be called “global warming”. The change in name reflects the fact that our climate will not just be warmer, but also different in terms of precipitation, humidity, snow cover and so on. In short, a wholesale change in our climate, hence the term “climate change”. I know there are probably some of you who don’t believe in climate change. I don’t have room in this article to present you with all of the (very substantial) evidence that our climate is changing and will change quite rapidly over the course of this century. I will simply say this, the best climate scientists in the world all agree that our climate will warm, by about 2-4.5°C over the next 100 years, and leave it at that. At the end of this article I make a couple of reading recommendations that may be helpful to the interested reader.

That amount of warming, 2-4.5°C doesn’t sound so bad, does it? What you

have to keep in mind is that is the global mean temperature change. It’s not the local change; some places will see much greater warming than the global mean, and of course some places will see much less warming. To give you some idea of what that means for us in Canada, Figure 1

THAT AMOUNT OF
WARMING, 2-5°C
DOESN'T SOUND SO
BAD, DOES IT?

shows the predicted mean daily air temperature in Guelph, Ontario from 1961 to 2100 as predicted by the Canadian Global Circulation Model (Environment Canada). In the figure you can see that by the end of the century winters will be about 8°C

warmer and the mean daily temperature will be close to zero. In Guelph, those changes in temperatures will be accompanied by generally wetter winters and springs, dryer summers, and autumns that remain about the same as they are now. Note too, that although the trend across the century is quite clearly upward, there is still considerable year-to-year variation. This means that when we get a particularly cold winter or cool summer, it is not a sign that climate change is all bunk (and equally neither is a particularly warm winter or hot summer proof that climate change is real). You have to look at the long-term trend to see what is happening.

OTS HIGHLIGHT

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Sports Turf Manager

FOR BETTER, SAFER SPORTS TURF. SPRING 2012.

Spring - an experience in immortality. ~Henry D. Thoreau



Our roots run 25 years deep.

WHAT'S ONLINE

www.sportsturfassociation.com

STA Membership Directory

Like changing your clocks in Spring, routinely check to see if your contact information is current. Your email address must be registered to login to the 'Members Only' section.

Members Only Section

STA Constitution and By-Laws. From our AGM, Executive Manager's Summary and Membership Analysis.

Michael J. Bladon

Educational Link

Search the Michigan State University's Turfgrass Information Centre

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Deadline for Summer 2012 Sports Turf Manager: May 26.

BY PAUL GILLEN

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Welcome to this, the first edition of our 25th year. It seems like just yesterday that Bruce Calhoun was convincing me of the need for an association such as this and the benefits that could accrue from my support. Little did I know then the extent to which I would become involved. The time has passed quickly and I have been fortunate to have been introduced to, and worked with, some truly great people who personify everything that is so good about our industry segment. This year will be our springboard for another 25 years of growth and sector improvements through research, education and communication.



STA President Paul Gillen greets WCTA members at the opening ceremonies of the association's 49th Annual Conference and Trade Show in Victoria, BC.

Photo: Richard Elkie, Rain Designs.

There will be more to follow on this. Then the recent Ontario Turfgrass Symposium (OTS) at the University of Guelph. A very special "thank you" to our sponsors, guest speakers and the committee for making this event so successful. Be sure to read the OTS Highlight article – "Climate Change and Turfgrass" – this issue's cover story. With our weather this winter, it is timely.

Our annual general meeting was held at Guelph during the OTS. The apathy of the membership was evident; the lack of attendance disheartening. This is your association and there are a number of people who give freely of their time and expertise for the benefit of all members. If you have suggestions for a better date, time or forum, email them to info@sportsturfassociation.com with the subject line 'AGM'. We welcome your comments. At the meeting we said goodbye to long serving directors Rick Lane and Dave Chapman – thanks to each of you for your contribution. At the same time we welcomed Terry Henderson to the board and look forward to sharing his enthusiasm. We are also pleased to salute Gord Horseman as the new Atlantic Canada director. Gord's passion for this industry will serve all of us well. Thanks to Ben Tymchyshyn for volunteering to serve as Treasurer.

A reminder that May 1 is the deadline for applications for the R. W. Sheard scholarship. Details and an application form are available on-line or through the office.

We have scheduled the Sports Turf Management and Maintenance Course at the University of Guelph from April 30 to May 3. This is the level 1 introduction to the subject and one of three courses required for the Parks & Open Space Professional Training Program. Again, details are available on-line or through the office.

Plans for our 25th Anniversary Field Day are being finalized. Watch for details!

The 2012 membership invoices are in the mail. These are due May 1 – please ensure that your renewal is sent in promptly.

Finally, we say goodbye to our long serving newsletter designer Joy Black and welcome, with this edition, Jackie Ranahan. Jackie is keen to hear any suggestions and ideas that will make this communication vehicle absolutely the best that it can be.

That's a wrap for me for this issue. Stay involved, and let us know if we can do anything to make your association better for you.

Sports Turf Association Elects 2012/2013 Officers and Directors

GUELPH, ON. Members of the Sports Turf Association (STA) elected the 2012/2013 officers and directors at the annual meeting held during the recent Ontario Turfgrass Symposium.

Returning to the board for a new term are president Paul Gillen, past president Gord Dol/Dol Turf Restoration, secretary Andrew Gaydon/Vanden Bussche Irrigation, together with incumbent directors Bob Kennedy/Sports Turf Management Solutions, Ken Pavely/Dufferin LawnLife, Paul Turner/G.C. Duke Equipment, Ben Tymchyshyn/MMM Group and Dennis Wale/City of Brantford. Joining the board is director Terry Henderson/City of Guelph.

Others currently serving the association are vice president Tennessee Propedo/City of Hamilton, and directors Bill Clausen/University of Guelph, Jason Inwood/City of Vaughan and John D'Ovidio and David Warden, both of the City of Mississauga. We express our appreciation to departing treasurer Rick Lane/City of St. Catharines and director David Chapman/City of Toronto who have provided immeasurable contribution and support for many years.

In accordance with the STA Constitution and By-Laws the board filled vacancies in its membership at its first meeting on March 20, 2012. Ben Tymchyshyn/MMM Group was appointed treasurer and Gorden Horsman/City of Moncton appointed director until the next annual meeting of the association.

NEW & RETURNING MEMBERS

Jim Althouse
City of Cornwall, ON

James St. John
City of Greater Sudbury, ON

Caleb Gibbons
Regional Municipality of Wood Buffalo
Fort McMurray, AB

Steve Bendo
Stantec Consulting Ltd.
Cambridge, ON

Scott Wentworth
Scott Wentworth Landscape Group Ltd.
Picton, ON

Diane Matichuk
Civitas Architecture Inc.
Ottawa, ON

John Graham
Graham Agriservices
Port Hope, ON

Robert Heggie
BMO Field
Toronto, ON

Henry Kortekaas
Henry Kortekaas & Associates
Pickering, ON

Sean Moher
Manderley Turf Products
Ottawa, ON



STA Board of Directors

MARCH 20, 2012. (L-R) Bob Kennedy, Ben Tymchyshyn, Dennis Wale, Dave Warden, Tennessee Propedo, Ken Pavely, Andrew Gaydon, Lee Huether, Paul Turner, Terry Henderson, Paul Gillen, Gorden Horsman (inset) joined via weblink.

Absent from photo:
Bill Clausen, Gord Dol, John D'Ovidio, Jason Inwood, Eric Lyons.

Odds & Ends...

TURF TRADES EMPLOYMENT ADS

Are you advertising a position or job searching? Visit us online at www.sportsturfassociation.com and click on Turf Trades. Cost is \$75 plus HST for STA members for a 2-month listing.

STM EDITORIAL CONTENT

Opinions expressed in articles published in the Sports Turf Manager are those of the author and not necessarily those of the STA.

Rerum
Cognoscere
Causas



Our roots run 25 years deep.

January 7, 1987

Dear :

In discussion with a few colleagues, there seems to be sufficient interest to indicate the possibility of forming a "Sports Turf Association for Ontario".

We would like to have a brainstorming session to discuss this opportunity with various professionals and associations. With the increased use of existing facilities plus the high cost to insure against injury, we see a need for an organization that would cover field sports at all levels.

The session will be held at the University of Guelph Arboretum Centre Board Room on February 11, 1987, at 2:00 p.m.

If you wish to attend, please reply to Mike J. Bladon, Grounds Department, no later than January 31, or telephone 519-824-4120, Extension 3460.

Sincerely,

M. J. Bladon
Assistant Head
Grounds Department

We had our cake and ate it too at the 2012 Annual General Meeting, held within days of the actual 25th anniversary of that historic gathering at the University of Guelph when the roots of the Sports Turf Association were established.

Sports Turf Association Seeks Safer Playing Fields

The newly formed Sports Turf Association is dedicated to safer and better playing fields, says Mike Bladon, interim chairman of the fledgling association. The organization will collect and disseminate educational, practical and scientific insights related to safer and better turf, and develop and co-ordinate co-operative projects in education and research. It will also work closely with existing organizations that have an interest in better sports fields or public turf facilities, says Bladon.

After several months of informal discussions among turf users and managers, a steering committee was formed at a recent meeting at the University of Guelph and with constituting in attendance represented a broad spectrum of the turf industry in Ontario: golf course superintendents, sports facility managers, consultants, the international Lawn Institute, university researchers, parks experts, government officials, sod producers and grounds maintenance personnel.

Of particular concern to many of those at the meeting was the need to minimize and avoid injury to those using athletic facilities, school yards and parks.

RAIDERS ANNOUNCE MOVE FROM COLISEUM

Al Davis, the owner of the Los Angeles Raiders, has never been afraid to fight the National Football League or local governments when it comes to the success of his team. He beat the NFL and he beat the city of Oakland and he is about to beat the Los Angeles Coliseum Commission.

When his team completes its ten-year contract with the Coliseum in 1991, Davis is moving the Raiders to their own stadium to be constructed in Inwood, a city 25 miles northeast of central Los Angeles. For more than a year, Davis has been battling with the Coliseum Commission over details that are important to the profitability of an NFL franchise. Agreements he thought had been reached with previous commissions have been

tract does opening up the possibility that Davis will move the practice facility and headquarters to Inwood. The team also holds practice camps in Oxnard, CA.

SPORTS TURF ASSOCIATION LAUNCHED IN CANADA

After numerous organizational meetings at the University of Guelph, Ontario, the Sports Turf Association (of Canada) became reality this summer. Michael Bladon of the University of Guelph has been elected president. The organization is busy planning its first annual conference and publishing its first newsletter.

objective of the new group, to improve the safety and athletic facilities by collecting scientific, educational knowledge. Cooperative research projects will be solutions to turf problems

STA is open to anyone safe sports turf. "We in the turf industry in its Bladon, "including professional sports, golf clubs, community colleges and sod producers." STA the sports of field hockey, soccer, rugby, softball, golf. Bladon invites interested to contact him, 185 Guelph, Ontario 20.

contributed more than \$3 million to renovate the stadium to keep the event in the city. Construction is scheduled to begin in November. The city wants to have most of the renovation completed by the 1988 series. CBS Sports will broadcast the event for the first time next year which will increase the national exposure of the event.

City officials estimate the event contributes more than \$12 million to the local economy each year. The Kansas City Royals AAA farm club also plays its home games at the stadium.

LANDMARK PURCHASES PALM BEACH POLO CLUB

Landmark Land Company, Inc., developer of PGA West and La Quinta Golf and Tennis Resort in La Quinta, CA, has purchased the Palm Beach Polo & Country Club in Wellington, FL. The posh polo club includes 11 polo fields, two 18-hole golf courses, 17 tennis courts and a championship croquet field.

In the past, Landmark has built its own golf course/real estate developments. The only other established property Landmark has purchased is Mission Hills in Rancho Mirage, CA. The company is already planning improvements to Palm Beach Polo & Country Club. "The first thing they did when they completed the purchase," says golf course superintendent James Branstrom, "was increase my budget by 20 percent." Gould Inc., the previous owner, had been trying to sell the club for almost two years. "We had been putting off buying some equipment," admits Branstrom. "Now we can get back to business."

Landmark's courses are famous for major tour events, both PGA and LPGA. The two courses at Palm Beach, one designed by professional golfer Jerry Pate and the other by golf course architect George Fazio, will probably follow the Landmark tournament tradition.

ST. LOUIS SOCCER PARK HOSTS OLYMPIC MATCH

The United States National Soccer Team will play an Olympic Qualification Match against Finland at St. Louis Soccer Park.



1989

STA/CGSA Conference, 1989

COLLEGE

ularity and sponsor National College Athletic Association (NCAA) and the steps to improve city-owned Rosenblatt Stadium. The College World Series has been held in Rosenblatt Stadium.

CELEBRATING 25 YEARS

The Agenda

Sports Turf Association of Ontario Discussion Meeting

February 11, 1987
Arboretum Centre
University of Guelph
Guelph, Ontario

- Welcome and Introductions
- 'A Sports Turf Association of Ontario' Opening Remarks:
Pat Tucker and
Mike Bladon, Grounds Department,
University of Guelph
- Discussion
 - Do we see a need for a Sports Turf Association?
 - If so, what would be the objectives of such an association?
 - Who should be members?
 - Should there be an affiliation with another group?
 - Who would volunteer to form an interim executive?
- An Action for the Future
 - Interim executive
 - Meeting time and place
- Adjournment

It Was Resolved

- All those at the meeting following the opening remarks were in agreement that a Sports Turf Association is needed now, and that it not, be limited to Ontario.
- The objectives/goals of the association are to be similar to the Sports Turf Managers Association (STMA)
 - Disseminate available information to Sports Managers
 - Research
 - Education: field days and seminars
 - Develop standards and guidelines for safety aspects
- There should be different membership categories and keep as broad as possible
- Suggestion of affiliation with STMA. Also an offer from CGCSA to dispense information through their magazine *Greenmaster* and to join them at their conference in Toronto in March 1988. Sod producers also very interested in working together.
- A volunteer Steering Committee was formed consisting of Mike Bladon, Annette Anderson, Uwe Sehmerau, Bruce Calhoun, and Bob Allen.
- Action for the future to use a Steering Committee to do ground work and present a report. The report to include all aspects of the formation of the association.

Conference

The first Sports Turf Association conference was presented in cooperation with the Canadian Golf Superintendents Association, March 9, 1988 during the Canadian Turfgrass Conference. With 100 people in attendance, the event, which was to become an annual one, was firmly established. This conference has through the years, morphed into the Ontario Turfgrass Symposium (OTS) that we know today, presented by the Guelph Turfgrass Institute, the Nursery Sod Growers Association of Ontario, the Ontario Ministry of Agriculture, Food and Rural Affairs, the Ontario Recreation Facilities Association, the Ontario Turfgrass Research Foundation, the Professional Lawn Care Association of Ontario, the Sports Turf Association, and the Centre for Open Learning and Educational Support, University of Guelph.

Our roots run deep and 2012 marks this quarter-century milestone. We salute all those who envisioned the Sports Turf Association 25 years ago, who through their dedication, determination and much hard work not only brought the association to fruition but established a foundation for sustainability. And the countless others who followed, with service on the board of directors, on committees, providing educational presentations, writing articles, sponsoring, exhibiting, advertising, and just spreading the word. And those who participated in the professional development and educational events and supported the association with their membership. We acknowledge you.

1999

2000

2001

2003

For twenty-five years the Sports Turf Association has been dedicated to the promotion of better, safer sports turf.

That commitment continues.



2012

OTS 2012 attracted nearly 500 delegates, speakers and sponsors to participate in more than 30 sessions of general and focused streams of education. Details for OTS 2013 will be available later this summer.

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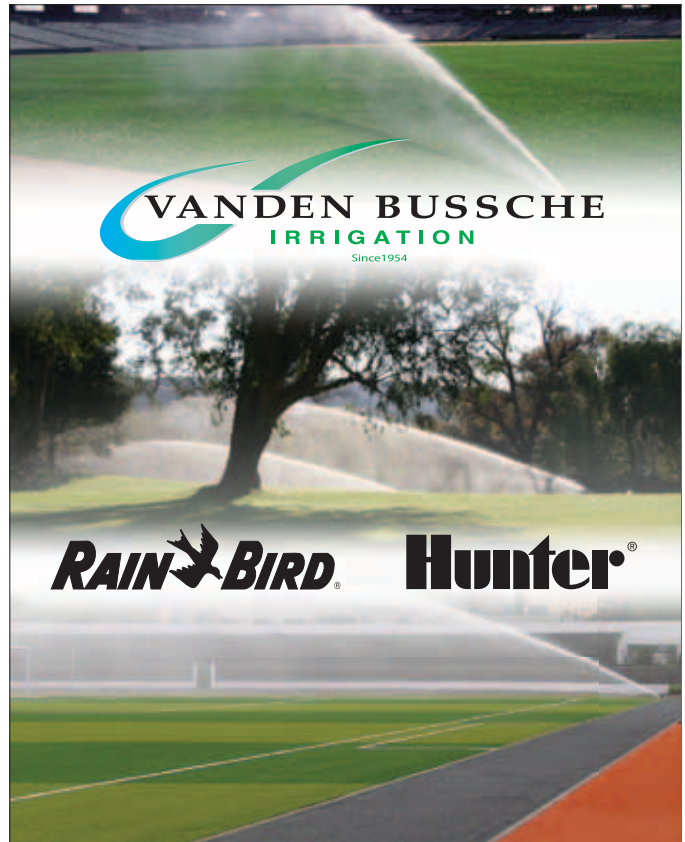
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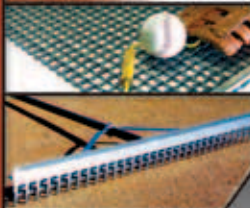


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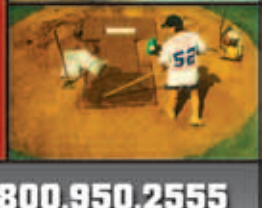
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*“Every spring is the only spring,
a perpetual astonishment.”*
— ELLIS PETERS

STA SCHOLARSHIP May 1 Application Deadline

The Sports Turf Association (STA) established a scholarship program in 1993. The STA Robert W. Sheard Scholarship (\$1,000) is funded through STA membership fees and is intended to assist students with the cost of tuition, books and related expenses.



The STA is dedicated to the promotion of better, safer sports turf through innovation, education and professional programs. If you or someone you know could benefit from the Robert W. Sheard Scholarship, please submit an application. Scholarship policies, criteria and an application form can be found online at www.sportsturfassociation.com.

Event Calendar

ASSOCIATION EVENTS ARE HIGHLIGHTED IN GREEN

April 30-May 3. Sports Turf Association Sports Turf Management & Maintenance Course. University of Guelph, Guelph, ON. During the ORFA Annual Professional Development Program. 519-763-9431, www.sportsturfassociation.com

May 1. Sports Turf Association Robert W. Sheard Scholarship Deadline. 519-763-9431, www.sportsturfassociation.com

August 14. Ontario Turfgrass Research Foundation Annual Fundraising Golf Tournament
MAGNA Golf Club, Aurora, ON. 519-824-4120 x 56149
www.otrf.ca

September. Sports Turf Association 25th Annual Field Day
Watch for details!
519-763-9431, www.sportsturfassociation.com

If you have an industry-related event you'd like publicized, contact Lee at 519-763-9431, info@sportsturfassociation.com.

Climate Change & Turfgrass

continued from page 1

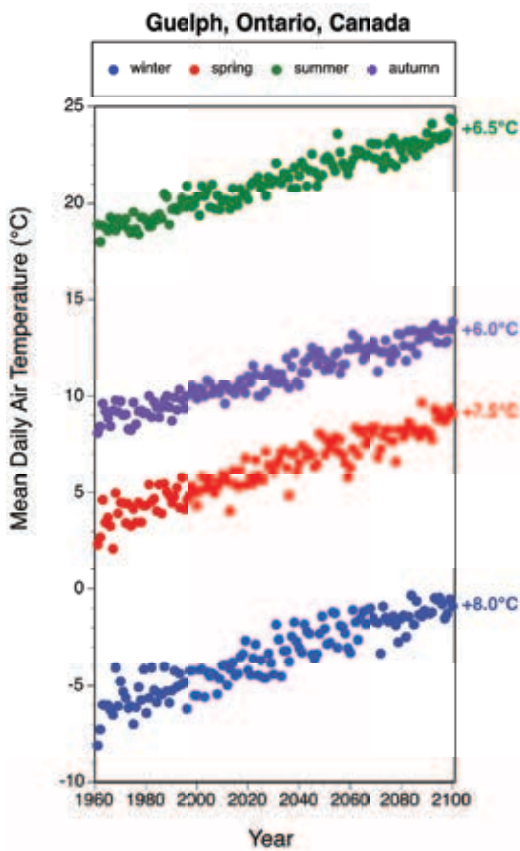


Figure 1. Average daily temperature by season for Guelph, Ontario, Canada (43.54N 80.25W) from 1961 to 2100, according to Environment Canada's Canadian Global Circulation Model (CGCM3T47) for a high greenhouse gas emissions scenario (A1B). For more information or to examine prediction for other locations, please visit <http://yukon.cccsn.ca/?page=dd-gcm>.

Climate change is caused by an accumulation of greenhouse gases in our atmosphere, and while they are all important, we biologists are particularly interested in carbon dioxide because that gas has a direct effect on plant growth. At least in cool season plants (also known as C3 plants) increases in the atmospheric concentration of carbon dioxide lead directly to increased rates of photosynthesis, the process by which plants convert carbon dioxide and water into sugar and oxygen. Higher rates of photosynthesis mean that plants grow faster and larger. Indeed, your colleagues working in the greenhouse industry have known this for a long time. In that industry it is common to 'flood' greenhouses with extra carbon dioxide to stimulate plant growth.

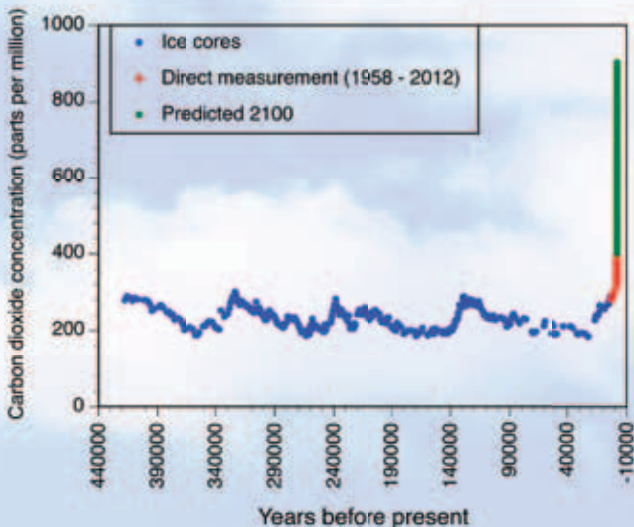
This graph visually depicts why climate scientists are so worried. At our current carbon dioxide concentration of 391 parts per million (ppm), we are already more than 100 ppm (40%) above any carbon dioxide concentration we have seen in the past 450,000 years up to the start of the industrial revolution, and we will certainly increase that concentration over the next 100 years; the question is by how much? That will depend on whether we get serious about reducing our carbon emissions and increasing our carbon sequestration, but the best guess is anywhere from about 550 to 1000 ppm of carbon dioxide by the end of this century.

Over the years, the turfgrass industry has developed many grass options for climates that are warmer and dryer than Canada, and so adapting turf applications to cope with changes in temperature and precipitation will probably not be such a difficult task. On the other

SO WEEDS MIGHT, OR MIGHT NOT, BE A BIGGER PROBLEM IN THE FUTURE.

Figure 2 shows how carbon dioxide has changed over the past 450,000 years, over the recent past (since 1958), and what we expect to happen in the near future.

hand, rising concentrations of carbon dioxide in our atmosphere represent an interesting challenge, and perhaps opportunity, for the turfgrass industry.



OTS HIGHLIGHT

Presented February, 2012
Guelph, Ontario.

Figure 2. Carbon dioxide concentrations derived from studying the air bubbles trapped in ancient ice in Antarctica (blue symbols), measured directly from the atmosphere (red symbols, only available since 1958), or predicted for the future (green symbols).

It is well known from experimental research that grasses such as tall fescue and perennial ryegrass will produce a lot more biomass, about 40% more aboveground and 80% more root mass, over the course of a growing season under elevated carbon dioxide. The challenges for turf applications will be that it's not only turfgrasses that respond positively to extra carbon dioxide, weed species will too. The question is: "will grasses or weeds benefit more from the extra carbon dioxide?" We don't know the answer to that question with any degree of certainty. One exception is probably that leguminous weeds (like clover and black medic) that are able to fix atmospheric nitrogen, will probably be more competitive than they are now, compared to turfgrasses.

As plants fix more carbon from increased photosynthesis, they become even more nitrogen limited, and legumes have the ability to overcome that limitation themselves. Management implications of these kind of changes might mean, all other things being equal, that turfgrass will require more frequent mowing to maintain height, and might need heavier or more frequent applica-






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tions of nitrogen fertilizer to compete with leguminous weeds.

So weeds might, or might not, be a bigger problem in the future. However there

are opportunities as well. In crop agriculture, researchers are looking at selecting cultivars that can make better use of the extra carbon dioxide in the atmosphere. Turf

The challenges for turf applications will be that it's not only turfgrasses that respond positively to extra carbon dioxide, weed species will too.

Table 1: Carbon costs accrued by maintaining whole golf courses in central Ohio, USA.

Product Use	Carbon Costs Per Year (kg Carbon or Carbon Equivalents)
Diesel fuel	6,557
Gasoline	3,618
Nitrogen fertilizer	1,498
Fungicides	1,377
Irrigation	626
Insecticides	353
Herbicides	206
Potassium fertilizer	138
Phosphorous fertilizer	96
All sources	14,469

Source: Selhorst & Lal (2012) Carbon Sequestration in Golf Course Turfgrass Systems and Recommendation for the Enhancement of Climate Change Mitigation Potential. In: Lal & Augustin (eds.) *Carbon Sequestration in Urban Ecosystems*. Springer. DOI: 10.1007/978-94-007-2366-5_23.



researchers too might like to explore this trait as a target of selection as well. In crop production selecting for increased biomass or yield in the presence of elevated carbon dioxide makes sense. For turf applications, this choice is less clear-cut. On the one hand, one might select for enhanced growth because it would increase the turf’s ability to recover from the damage common in many applications. On the other hand, one might want to select for slower growth in the presence of higher concentrations of carbon dioxide, so as to keep maintenance costs low, particularly mowing costs.

We have been talking about how to adapt our management to cope with climate change; the flip side of adaptation is called “mitigation” and it deals with how we can change our management practices to reduce our impact on climate change. There are two aspects of turf management that impact mitigation: increasing carbon sequestration and decreasing carbon emissions. Carbon sequestration refers primarily to how much carbon gets stored in the soils of various ecosystems. Turf applications affect sequestration primarily through land use. Turf applications occupy a relatively small amount of land compared

to other types of land use. For example, in Ontario, crop agriculture occupies more than 20 times the land area occupied by turf. Hence turf will tend to have a small impact, positively or negatively, on carbon sequestration. Nevertheless, turf applications can have a positive impact on carbon sequestration by converting depleted

PERHAPS THE LARGER IMPACT THAT TURF SYSTEMS CAN HAVE IN MITIGATING CLIMATE CHANGE IS IN THE “CARBON COSTS OF MAINTENANCE”.

agricultural soils, which hold very little carbon, into turf dominated soils which can, relatively speaking, hold large quantities of carbon.

Perhaps the larger impact that turf systems can have in mitigating climate change

is in the “carbon costs of maintenance”. Maintenance costs for golf courses in central Ohio are illustrated in Table 1. We see that the largest potential carbon savings are from reducing nitrogen fertilizer use, and cutting back on both diesel and gasoline uses. If some maintenance operations can be powered with renewable energy, the overall impact of turf systems on climate change can be significantly reduced.

That’s a very quick look at some of the issues surrounding climate change and turfgrass. There is still a lot of research to be done in this area. Turf systems have received far less attention than production agriculture systems and pasture systems. Readers interested in finding out more about climate change science might be interested in reading: *The Discovery of Global Warming* by Spencer Weart (Harvard University Press). It provides a fascinating history of the discovery and development of this area of science, but it reads more like a mystery than a science or history book. Readers who want to learn more about the biological and ecological impacts of climate change might be interested in reading my new book: *Climate Change Biology* (CABI publishing).

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Phosphorus Losses and the Urban Envir

Doug Soldat, Assistant Professor, Dept. of Soil Science, University of Wisconsin-Madison

OTS HIGHLIGHT

Presented February, 2012
Guelph, Ontario.

4 ppm

17 ppm

5 ppm

7 ppm

4 ppm

In many parts of the US, the use of phosphorus fertilizer is restricted to situations where a soil test shows the agronomic need for the nutrient, or during the first year of establishment (no soil test required to apply phosphorus). The restrictions vary from city to city and state to state much like provincial cosmetic pesticide bans vary from province to province, but in general most restrict the use of phosphorus except during the establishment of new stands, and in cases where soil phosphorus is deemed deficient.

Why all the fuss about phosphorus?

from Turfgrass onment



Figure 3. Mehlich-3 soil test phosphorus levels below 7 ppm negatively affected turfgrass quality on this sand-based putting green. There were no differences in turf quality above 7 ppm.

Excessive phosphorus can be a major detriment to water quality, especially in fresh water ecosystems. In many lakes, streams, and rivers, phosphorus is the most growth limiting nutrient. Therefore, additions of phosphorus are usually accompanied by increases in algal growth. Increased algal growth decreases the recreational value of the water body, depletes oxygen in the water which harms aquatic life, and increases the need for chemical treatment of the water.

Phosphorus is often a limiting nutrient in turf and agricultural systems too, so farmers and turf managers apply phosphorus fertilizer to maximize yield or turf quality. However, when excessive phosphorus is applied, it builds up in the soil and eventually finds its way to a water body. Phosphorus is very insoluble in soil and tends to bind tightly with soil particles in the upper few inches. In agricultural areas where phosphorus-rich manure is continually applied, soil phosphorus levels often vastly exceed what is required for optimum growth. Once phosphorus is built up in the soil, the primary way it finds its way to water bodies is by soil erosion (Figure 1). Large rains or snow melt events cause a process called runoff where water flows over the land until it reaches a body of water. If the soil is poorly protected, runoff will also carry away the phosphorus-rich topsoil – once the topsoil is detached from the land, we call it “sediment”.

So far, this has been a story about agriculture. But research has shown that urban areas actually contribute as much or more phosphorus to water bodies than agricultural areas. Urban areas don't seem to have a manure spreading problem or an apparent issue with topsoil washing away, so where is the phosphorus coming from? The average politician or citizen has reasonably concluded that lawn fertilizer must make up a large portion of this amount, and therefore banning turfgrass fertilization will likely solve the problem. However, there is much more than meets the eye with urban phosphorus pollution.

First, it's clear that sediment losses actually are a serious issue in urban environments. Scientists at the United States Geological Survey examined the phospho-



Figure 1. Two of the best ways to keep phosphorus from entering water bodies are to not let phosphorus build up to excessive levels in the soil, and to protect the soil from being washed away – usually by maintaining a dense ground cover. While these practices sound relatively simple, scores of scientists continue to study ways of reducing phosphorus losses from agricultural areas as it remains a very important environmental issue. *Photo: Webster's Online Dictionary.*

rus and sediment losses urban and rural watersheds in Southeastern Wisconsin. They found that the phosphorus losses from urban areas were slightly greater than from the rural areas, but that the sediment losses from urban areas were four times greater than from rural areas (Corsi et al., 1997). Controlling the sediment loss from urban areas would presumably also reduce the phosphorus losses from these areas. So where does the sediment from urban areas come from? Building and road construction are major culprits. David Thompson maintains a blog called *The Contractor Report* (contractorreport.blogspot.com) which attempts to document the impact of construction practices in and around Madison, WI. The collage in Figure 2 was taken from that blog.

Areas that have dense turfgrass cover are notoriously low in sediment losses (Soldat et al, 2008). However, when the ground is bare, the exposed soil can be quickly washed away. In rural areas, top soil may be carried away from the farm but eventually be caught in a grassed buffer strip and never reach a body of water. But urban areas have well-connected networks of impervious surfaces. Sediment that is deposited on these surfaces can be quickly

washed away into a storm sewer and find its way to a water body. The Wisconsin Department of Natural Resources estimates that 50 to 100% of eroded top soil in urban areas reaches a body of water compared to less than 10% from rural land uses (Johnson and Juengst, 1997).

Controlling sediment losses from urban areas should become a top priority if reducing phosphorus losses from these areas is a major goal. However, the focus in the US has been disproportionately on reducing phosphorus fertilizer applied to lawns and other turf areas. Will this approach work? The research suggests that the restrictions are not likely to have a large impact on urban water quality. Dr. Wayne Kussow (2008) at the University of Wisconsin measured phosphorus losses from three turfgrass management systems: 1) non-fertilized control, 2) Scotts Turf Builder (with phosphorus) and 3) organic fertilizer (with phosphorus). Even though no fertilizer was applied to the control treatment, more phosphorus (0.54 kg/ha/yr) was found in the runoff than the other two treatments receiving phosphorus (0.34 and 0.36 kg/ha/yr). The non-fertilized treatment had poorer density and therefore greater exposed soil and greater amounts of



Figure 2. Everyday images of sediment losses from construction sites in urban environments. Images: contractorreport.blogspot.com

runoff during storms than the two fertilized treatments. Similarly, researchers in Minnesota found no significant differences or significantly less phosphorus in runoff from plots receiving fertilizer than non-fertilized control plots during a three-year period (Bierman et al., 2010). They also found greater phosphorus losses when phosphorus was applied at three times recommended rates, but similar losses to no phosphorus at all when the recommended rate of phosphorus was used. These and other studies (see Soldat et al., 2008) clearly demonstrate that dense ground cover reduces phosphorus losses.

However, often soil phosphorus levels are sufficient to sustain healthy turf without additional applications. In these situations, adding phosphorus fertilizer is wasteful economically and environmentally. Soil testing is an effective technique to determine if phosphorus fertilizer should

be applied. Fertilizer prices are at nearly all-time highs, and are unlikely to drop if a global demand for fertilizer continues to rise. Additionally, phosphorus is mined in only a few locations worldwide, and phosphorus reserves are critically low. For these reasons, it pays to be miserly with phosphorus fertilizer.

WHEN ESTABLISHING TURFGRASS FROM SEED, APPLYING PHOSPHORUS FERTILIZER NEARLY ALWAYS ENHANCES ESTABLISHMENT.

Figure 3 (pages 14-15) shows a picture of a phosphorus soil test calibration study recently completed (Kreuser et al, 2012). When soil phosphorus levels were at or above 7 ppm (Mehlich-3), the turf quality was excellent. Below 7 ppm, classic phosphorus deficiency symptoms appeared.

Most soil testing labs will use 30 ppm as the cut-off for optimum soil P – a fairly conservative number. I strongly recommend not applying phosphorus fertilizer unless soil test levels indicate a potential problem, and keep in mind that every plot in Figure 3 would come back from the lab with a “low” or “very low” for every single plot, even though true deficiency symptoms only showed up on plots with less than 7 ppm phosphorus.

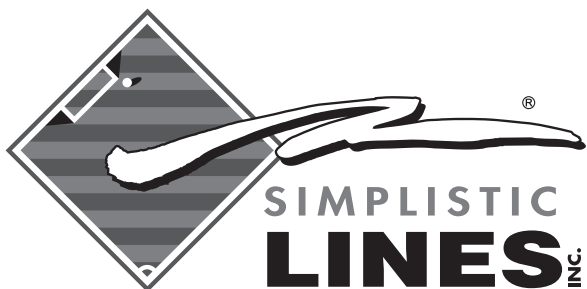
When establishing turfgrass from seed, applying phosphorus fertilizer nearly always enhances establishment. Hamel and Heckman (2006) found that turf establishment was enhanced when phosphorus was applied to soils with less than 200 ppm Mehlich-3 P, above 200 ppm yield was usually not increased further. In my experience, it’s fairly rare to find soil test phosphorus levels exceeding 200 ppm. Applying phosphorus to speed establishment is an environmentally friendly practice because the shorter amount of time bare ground is exposed, the lower the potential for sediment loss.

In conclusion, turf fertilization is a component of phosphorus coming from urban areas, but pales in comparison to the phosphorus that is lost from urban building and road construction practices. Legisla-

tion restricting the use of phosphorus fertilizer is likely to have a limited effect on urban water quality. However, application of phosphorus when soils already contain a sufficient supply is a wasteful use of a precious resource.

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WHAT LIES BEN BMO FIELD



OTS HIGHLIGHT
Presented February, 2012
Guelph, Ontario.

MLS Cup 2010. Displays the condition of turf that the system can provide late in the year.

It's a chilly overcast day in mid March and the Toronto Football Club is playing their home opener at BMO Field. Over 22,000 people are in attendance sitting and watching the game live with even more on TV, yet very few pay any attention to the pitch and the fact it's actively growing and healthy in March. When you look at the grass, you wouldn't suspect what is happening below BMO Field. There are many systems in place to produce a high quality pitch in less than ideal weather conditions. In February I spoke at the Ontario Turfgrass Symposium

in Guelph and was asked to recap it for the *Sports Turf Manager* magazine.

BMO Field is about to start its 6th season, its 3rd season with a natural turf field. It was originally constructed with FieldTurf, however after a few years of use it was in rough shape creating a serious need for a better solution. Artificial turf was viewed as a negative by coaches, players and officials. Not only is it not favoured to play on but it also makes scouting difficult in attracting high quality players. In many instances players will not sign with a club that plays on artificial turf.

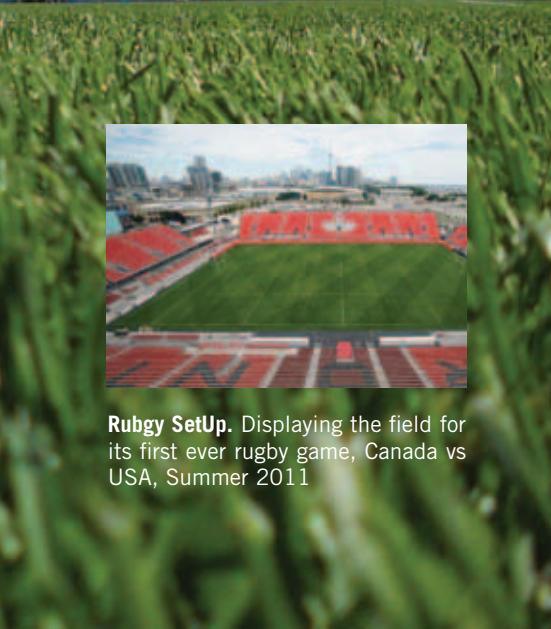
At BMO Field, for a Real Madrid game a few years ago, natural turf had to be brought in and installed over the artificial turf so that the teams would come and play an international friendly. With this strong desire and requirement from professional levels to play on natural turf, the decision to convert from artificial turf was made in the winter of 2009.

BMO Field was constructed as a two acre USGA style green that is planted with 4 different types of Kentucky bluegrass: 35% Impact KBG, 25% Skye KBG, 15% Cheetah KBG, 25% SR 2284 KBG. There

EATH



Robert Heggie, Turf Manager, BMO Field



Rugby SetUp. Displaying the field for its first ever rugby game, Canada vs USA, Summer 2011

are 12 inches of a 95/5 USGA mix above the glycol heating system. The drainage is encased pea stone and is hooked up to the SubAir System.

One of the highlights of BMO Field's construction is the glycol heating system. This system provides the ability to control the temperature of the soil through conductive heat. There are over 42 km of $\frac{3}{4}$ " piping that run 6" apart under the soil that carries the heated glycol to and from the 8 million BTU's of heat generated by the 4 natural gas boilers. The guidelines that we follow for root growth temperatures for

Kentucky bluegrass and perennial ryegrass are as follows: 8°C : Too cool; 8-15°C Roots become active; 15-22°C Optimum root temperature; 22-26°C Risk of Burn; >26°C Burn

With the ability to control root zone temperature we can break plant dormancy and actually grow turf in early spring or late fall, while weather is less than ideal. When the heater is used in conjunction with a grow cover it creates a 2 acre heated greenhouse. The temperature of the field is monitored by 12 sensors spread throughout the field in a uniform pattern. These Turfguard sensors monitor moisture, salinity and temperature and I can access the information online. The glycol system is wirelessly connected to these sensors and the valves on the heating system open and close depending on their need. Even with the ability to control soil temperature however, the lack of sunlight in the early spring and late fall restricts plant growth. We don't supplement sunlight to BMO Field. Some stadiums that have greenhouse grade lights move them around the field as needed.

The second major feature of BMO Field is the SubAir system. It is basically an oversized, glorified shop-vac that's hooked up to the drainage system. It gives us the ability to remove moisture from the field prior to games and during rainfall, helping to minimize a saturated soil profile and ensure a firm pitch for game play. The system can pull up to 15" of water per hour; the soil profile only drains at 8.7" of water per hour. There is a layer issue which I will explain later, it only drains at 0.9" per hour.

ing oxygen and gas levels. Pressurizing the system also pushes the heat from the glycol system up through the profile to the surface. The glycol system would not be as efficient as it is without the help of the SubAir system. It can also be used in the summer to lower soil temperatures, pushing a cooler night time air into the soil. The combination of the glycol and SubAir systems gives Toronto one of the most state-of-the-art fields in Canada and even North America.

We keep things basic and don't over complicate anything for pitch maintenance. I am a strong believer in soil, tissue and water tests to determine what nutrients, supplements and soil conditioners need to be focussed on. My granular program is a mix of different NPK fertilizers, K-Mag and a few different micro packages focusing mainly on iron. For a surge of growth and field recovery after heavy use, I focus on soil drenches (ammonium thio-sulfate), then harden the plant off with foliar applications of different nutrients like calcium, silicon and potassium. Humic acids are used to drench the soil breaking up bicarbonates and releasing vital nutrients into the soil for plant availability. The majority of my foliar applications are used to enhance the field's colour for games, focusing on magnesium, iron, a little bit of nitrogen and other micro nutrients. I am also a believer in silicon and seaweed products, spraying them before most big events and when I know there will be lots of play. My fertility program might sound a little extensive, but I believe that this is the reason I have NEVER needed to spray any pesticide. A healthy plant combined

ONE OF THE HIGHLIGHTS OF BMO FIELD'S CONSTRUCTION IS THE GLYCOL HEATING SYSTEM.

There are two sensors in the field for the monitoring of oxygen levels allowing for optimal levels for plant growth. We try to maintain an 18-21.5% moisture level for plant health. The SubAir system applies suction to the drainage lines removing water through the profile so that we don't have to wait for the effects of gravity and percolation. Conversely, the system can be pressurized pushing air through the drainage lines into the soil profile increas-

with the ability to control temperature and moisture levels, helps limit or eliminate insect, disease and weed pressure.

There is a constant need for aeration and topdressing to relieve compaction and level the playing surface. The problem that arises is there are very few times in the team's schedule that provides the opportunity for recovery from an aeration process. Overseeding with perennial ryegrass and Kentucky bluegrass is done



GlycolSystem. The copper pipes on the far left are the outgoing pipes to the field. Those to the right are the return lines. On the right you can see the 4 x 2 million BTU boilers.

on a regular basis to promote juvenility of the pitch. The mix I use is 85% Champion perennial rye and 15% KBG. The seeding rate that I follow is 8-12 lbs/1000ft², and higher rates in heavy traffic areas like the goal mouths, sidelines and training areas.

When the field was planted a little over 2 years ago, there was little notice given to the sod supplier that there was going to be a need for a Kentucky bluegrass grown in a USGA mix. Since there was no way to get a field ready in time, it was planted with a locally harvested sod with a local soil. The field was planted the end of March and there were only 2 weeks to get the field to knit before the first home game. The sod was cut thick to ensure that it would not shift for the first game. As well so there were more roots, which in turn means more carbohydrates, maximizing the odds of a tight field for the first game. Since the sod was cut so thick, it was clear that there was a layer issue that I would have to deal with. To try to beat the layer up, I aerate as often as I can; aerating more than 10 times

in two years. Every time I aerate I also top-dress with 35-40 tons of sand. Based on 2" spacing and 1/2" tine sizes I am only

ANOTHER INTERESTING MATERIAL WHICH WILL BE USED IN FUTURE APPLICATIONS IS A NYLON FIBRE THAT IS INJECTED INTO THE TOP LAYER OF THE SOIL PROFILE.

removing a little less than 5% of the field with each aeration process, making the layer issue an almost neverending battle.

The problem with the layer is it hardens off too quickly, minimizing gas exchange and water penetration. The layer creates a reversed water table effect. This isn't just a problem in itself; it also drastically reduces the efficiency of the SubAir system. The long term solution would be to continue aerating and topdressing, or considering a drill and fill program. The quick solution would be either to re-sod the pitch using a sod grown specifically for this application or using a washed sod. In both situations, the layer issue would no longer be present and would create a better growing environment.

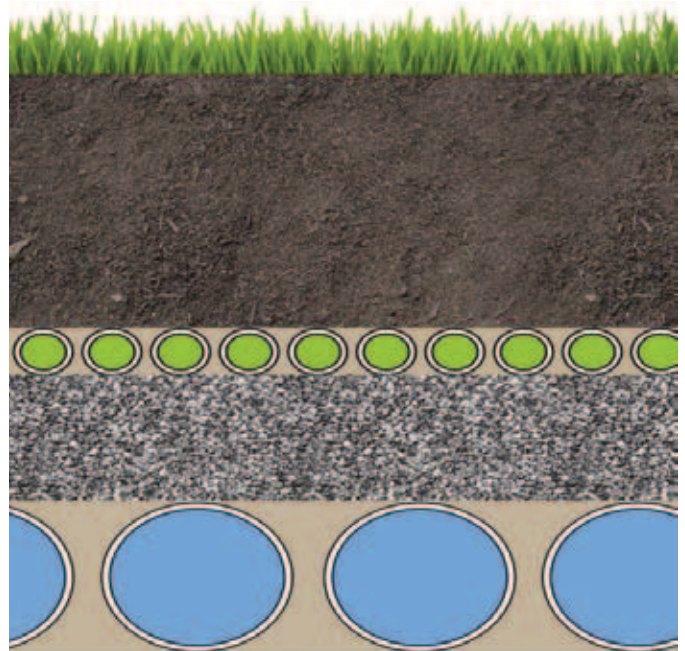
Another interesting material which will be used in future applications is a product called StaLok. It is a nylon fibre that is injected into the top layer of the soil profile. The idea behind it is that it creates reinforcement for the root hairs. It is harder to tear nylon than it is to tear a root hair. So if a root hair wraps itself around a tiny piece of nylon it should make it stronger. A good analogy that I often use for the

product is, “it’s like a rebar for your soil and turfgrass”. They say that it increases root strength by up to 215% and soil porosity by up to 7%.

Field usage is a topic I often get asked about as people sometimes think that my pitch doesn’t get a lot of play. To be honest it sees a higher than average amount of play for a professional level pitch. The field sees about 30 home games (Team Canada Men’s, Woman’s and Toronto FC) with two practices for each game, one or two rugby games plus practices, corporate partner events, and 24-48 hours of community rentals per month. It is also used as the practice field for Toronto FC since they do not have a practice facility as of yet. The time frame in the schedule may not always exist for resodding damaged areas. In my opinion a dead spot is still safer to players and officials than a newly sodded area that could flip up during game play. So if you ever happen to catch a glimpse of a little bare spot on the pitch when you are watching a game, remember that there is more than just the one game being played on the field.

The pressure on BMO Field will be alleviated in the summer of 2012. The Toronto FC Academy practice facility is being built at Downsview Park and will consist of 3 natural turf fields and one artificial, as well as an indoor field house, gyms, and locker rooms. Two of the natural fields will be built with a heated SubAir system, a different method for heating a field. The artificial field will be bubbled in the winter, providing a place for the teams to practice all winter and early spring. This facility is the first of its kind in Canada and will surely be a great step forward for the sport of soccer in the Greater Toronto Area and for the whole country. It is an exciting time for soccer and sports field management in Ontario!

There are many unique systems in place at BMO Field all ensuring a high quality turf at any time of year. It is not inex-



Profile. Turf is cut at 3/4"-1", 12" of 95/5 mix, glycol pipes displayed in green, pea stone layer and drainage displayed in blue.

pensive or easy to grow turf in Canada at certain times of year, but the benefits are well worth it. When you have professional sports teams being televised across Canada and the USA, near field perfection is always a must!

If you have never been to a Toronto FC game, I would highly recommend it. It is unlike any other sports atmosphere in Toronto. Plus I hear they have really nice grass...

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OTS HIGHLIGHT
Presented February, 2012
Guelph, Ontario.



Circle Checks Are Not Just For Your Equipment

Terry Piche, Technical Director, Ontario Recreation Facilities Association Inc.

Parks and open space job positions today require demonstrated competency, independence and knowledge as well as the ability to perform routine assignments and tasks. The old way of hiring and releasing workers into the work-force hoping they knew their stuff is no longer considered acceptable. Today's parks and open space professionals must build set training objectives into their hiring and staff preparation process. Operations that either rehire experienced seasonal workers from year to year or that believe a worker with a certification in their résumé requires no additional training, are at risk of legal accountability.

The first test is the competency of those who are conducting the hiring. Are they well informed and knowledgeable regarding the employer's legislative workplace obligations? Have they remained current and up-to-date by actively attending professional development courses, reading industry related publications and staying in tune with advancing techniques and technologies?

If you are conducting business the same today as you were 5 years ago chances are that you have not stayed up-to-date. A common trap is the hiring job description. Too many operations set the job skill expectation level too high when hiring. Most fail to realize that when you ask for a variety of skill sets in the hopes of capturing the best candidate, you

**FOR EVERY EXPECTED
TASK THERE MUST BE
AN EQUAL AMOUNT OF
TRAINING PROVIDED
TO HELP PROVE
COMPETENCY OF THE
INDIVIDUAL.**

will need to provide training for the skills not arriving with the candidate or restrict their work until adequate training can be provided.

Management must set their required training objectives by reviewing what work

is to be conducted by each of their workers. For every expected task there must be an equal amount of training provided to help prove competency of the individual. For example, if the worker is expected to use a push mower, there must be sharing of written information and standard operating procedures followed by a demonstration by a competent person on what the shared information has stated. It is a simple 3-step approach: 1. Theoretical review – read it! 2. Practical review – do it! 3. Sign-off on it! If you have not completed all 3 steps then the worker should not be doing the work.

Begin by collecting all internal written policies and procedures as well as owner's manuals and operational videos. Then consider creating tests to confirm that the worker has read, viewed and understands the material. Now follow it up with an in-house hands-on training session. All workplaces must invest in comprehensive ongoing worker training. Training was once considered a nicety... it is now considered a necessity!

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