# SPORTS TURF MANAGER

*... for safe, natural sports turf*

SPRING 2006 • VOL. 19, NO. 1







HELMUT SPEISER, OMAF

ONTARIO Turfgrass SYMPOSIUM

# A Grab Bag of Research Results

## 2005 GUELPH TURFGRASS INSTITUTE RESEARCH UPDATE

Despite taking a few weeks off to attend the International Turfgrass Research Conference in Wales in July, researchers at GTI had a busy summer doing various research projects of interest to turf managers. These projects involved collecting data on the efficacy and performance of new products or formulations, controlling new pests, and evaluating new turf cultivars.

The mandate of the GTI is to do research to provide the best information possible to turf managers and to suppliers of management materials – keep in mind that some projects are early investigations of new products, so we may not have all the answers yet. We're presenting a snapshot of a few of the trials here to give you a taste. For the full results, watch for the 2005 GTI Annual Research Reports which should be available in late spring. There you will find all the data – graphs, charts and figures.

### Leatherjacket control – "Evaluation of the effects of experimental natural products on survival of European cranefly (*Tipula paludosa*) larvae"

This is a very preliminary trial of some experimental natural waste-based products on an emerging turf pest. In fact, we had to do some learning on how to best survey populations of leatherjackets and culture them in the greenhouse in the course of doing the trial. There will be more leatherjacket work coming out of GTI in 2006 and beyond.

The project involved first assessing various survey, sampling and collection methods. Of the various soil drenches and other methods we tested, we found that the most effective by far were an irritating drench of o-dichlorobenzene... → p. 10

**Above:** NTEP 2005 Kentucky bluegrass cultivar trial 5 weeks after seeding. Inset: hand seeding of cultivar plots. See page 10 for details.

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# The President's Desk

GORDON DOL

## Spring is on the horizon

Another interesting winter is almost gone. We are now getting a few warm days from time to time, teasers of what is yet to come. We had a fairly normal December and a warm and wet January that was followed by a February that brought us quite a bit of snow, especially in those areas traditionally prone to snow squalls. It is now becoming apparent that these weather fluctuations may lead to winter injury due to heavy ice formation on some fields. Check your turf and be prepared!

Over the past couple of months there have been a number of very good and well attended turf shows in Ontario. Most recently was the Ontario Turfgrass Symposium of which the Sports Turf Association is very proud to be a part. By all accounts, we've had another great show. Very special thanks should go to the OTS Committee and the University of Guelph's Office of Open Learning for a job well done. We had a great lineup of speakers and a great venue. The OTS continues to be the premier turf education forum.

During the OTS we held our Annual General Meeting. The 2005 reports from various committees were presented to the membership. Also presented was the proposed budget for 2006 which includes a modest increase to membership fees. We're always hesitant to increase prices; however, our costs keep going up, so membership fees must follow suit.

During the AGM we also made an amendment to the constitution and bylaws of the association to increase the number of directors from 11 to 15. Our membership has increased over the years. There is a tremendous amount of work that is being done by a small group of people. This change will help the board to better service member needs. On this note, we always welcome and encourage participation from our membership on various committees. If you would like to help, please call Lee Huether at the STA office or send us an email.

Also at the AGM nominations were held for board positions. First of all, I would like to thank Andrew Gaydon – Vanden Bussche Irrigation – now past president, for his leadership over the past two years. Returning board members include Jane Arnett Rivers, Town of Oakville and Paul Turner, G.C. Duke Equipment Ltd. New board... → page 4

**Above:** Jane Arnett-Rivers presents outgoing President Andrew Gaydon with a plaque of appreciation at the AGM.

**Above:** On behalf of the STA, appreciation is expressed to Director David Smith (right), who is stepping down at the completion of his term, by President Gord Dol.

members include Dave Chapman, City of Toronto; Bob Kennedy, Sport Turf Management Solutions; Grant Mckeich, Town of East Gwillimbury; and Gregory Snaith, EnviroIrrigation Engineering.

Board members with one year left in their term include Rick Lane, Haldimand County; Bob Sheard; Brian Adriaans, City of Burlington; Cam Beneteau, Ridley College; Roy Forfar, York Region District School Board; and Paul Gillen, Holland Equipment Ltd. David Smith has stepped down as a board member. Dave, your hard work and dedication to the STA board will be missed. At the AGM, Andrew Gaydon and David Smith were presented with a plaque as a token of our appreciation for all their hard work.

Membership invoices will soon be mailed. Your prompt attention to this is greatly appreciated. For your convenience, we now accept most major credit cards.

Plans for our 19th Annual Field Day are now well under way. It will be held at Ridley College in St. Catherine's on September 21, 2006. Stay tuned for more details as this promises to be another great one. Thank you to Mr. Cam Beneteau and Ridley College for hosting this event.

Finally, I look forward with great enthusiasm to working with this exciting group of individuals for my term as president. I have been on the board since 1995 and have thoroughly enjoyed the experience and meeting so many great people over the years. ♦

# WRAPPING UP OTS 2006

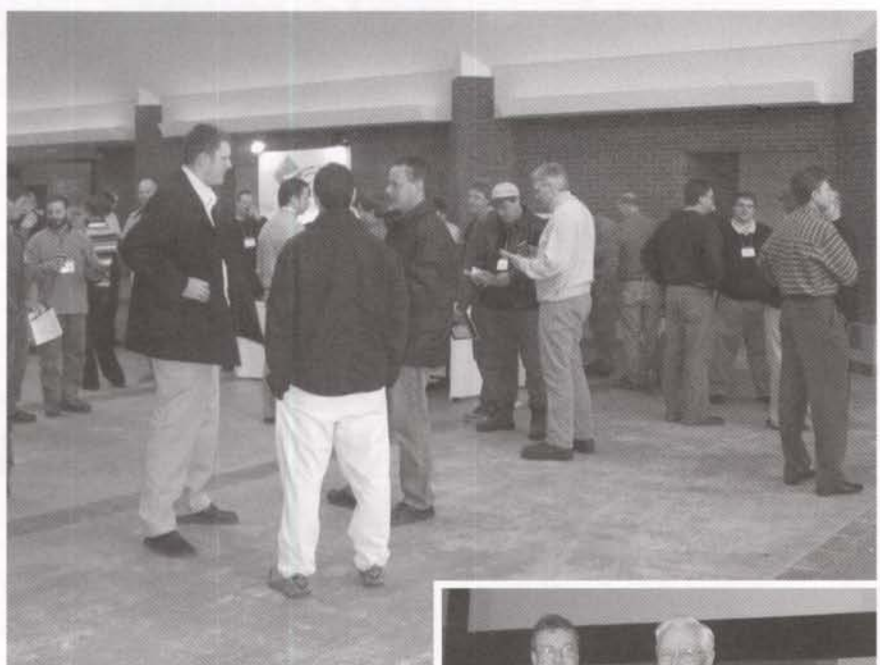
HELD AT THE UNIVERSITY OF GUELPH • FEBRUARY 20 & 21

The Ontario Turfgrass Symposium's (OTS), *Strengthening Our Roots: A Growing Tradition,* attracted over 600 participants to this year's show, acknowledging the outstanding contribution the Symposium makes to the Canadian turf industry through education, research and training.

In 2006, OTS celebrated its 15th anniversary of turf management education and leadership at the University of Guelph's newest complex – Rozanski Hall. Delegates, speakers and sponsors alike were impressed with this leading-edge facility consisting of modern classrooms with state of the art presentation capabilities.

Seminars featured the latest in scientific research and practice concerning tools for integrated pest management, potash and phosphorus, alternative controls, regulatory issues, artificial turf and customer service. In addition, programming focused on further enhancing the existing golf, lawn care, sod production and sports turf management sessions.

Proud sponsors of the symposium are the Guelph Turfgrass Institute, Sports Turf Association, Nursery Sod Growers Association, Ontario Recreation Facilities Association, Professional Lawn Care Association of Ontario, Ontario Ministry of Agriculture and Food and Rural Affairs, and the Office of Open Learning at the University of Guelph.



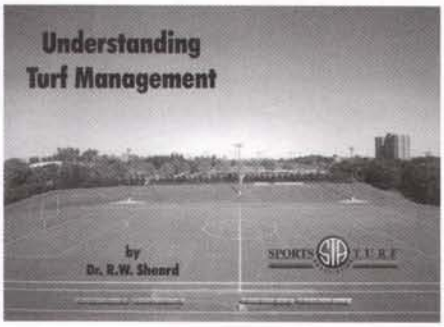
**Above:** Delegates mingle at OTS 2006.

**Right:** Chris Mark (left), OTS Committee Chair, pays tribute to STA Director Bob Sheard, who served on the OTS organizing committee since its inception until his retirement in 2006. Along with Annette Anderson, Bob was the driving force behind producing this annual premier educational conference. At this year's OTS, Bob stated that education, particularly outside the normal classroom is the secret to advancement.

# SECOND EDITION PUBLISHED

STA RE-RELEASES THE POPULAR *UNDERSTANDING TURF MANAGEMENT*

Within five years of the printing of 1,000 copies of the first edition of *Understanding Turf Management*, the supply has run out. The author, R.W. (Bob) Sheard, kindly agreed to prepare a second edition for the Sports Turf Association which was printed in time to be used by the 2006 class of the University of Guelph's Turf Managers' Short Course.




Bob says few changes have been made in the second edition; the principal revisions being the correction of typos and grammatical errors and upgrading prices and application rates to conform to 2005 recommendations.

Few changes have been made in the second edition of the book.

The quick sale of the first edition and the lack of suggestions for changes or additions to be made in the second edition are strong indications that *Understanding Turf Management* is fulfilling an important niche as an inexpensive, but authoritative text for the novice turf manager as well as a handy reference for the more experienced practitioner. Please visit www.sportsturfassociation.com for ordering details.

## Coming Events

**April 5, 6, 10 & 11**
*Guelph Turfgrass Institute Landscape Pesticide Certification Preparation Course (refresher)*, Guelph, ON
Info: (519) 824-4120 x 52501
www.gti.uoguelph.ca (Education)

**April 30 – May 4**
*Ontario Recreation Facilities Association 51st Annual Professional Development Program*
Guelph, ON
Info: (416) 426-7062
www.orfa.com

**Aug. 11-19, 2006, Aug. 10-18, 2007**
*International Softball Congress Schneiders World Fastball Tournament*
Peter Hallman Ball Yard
Kitchener, ON
Info: www.kwfastball.com

**SEPTEMBER 21, 2006**
Sports Turf Association 19th Annual Field Day
Ridley College
St. Catharines, ON
Info: (519) 763-9431
www.sportsturfassociation.com

**NOVEMBER 1, 2006**
STA Scholarship Application Deadline
Info: (519) 763-9431
www.sportsturfassociation.com

### GET ON THE LIST!

Contact the STA if you have an event you'd like to advertise in the STM.

### WELCOME TO THE STA!

**Brian Hughes**
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DSSS, Design et solutions pour surfaces sportives enr.
Outremont, QC

**Grant Mckeich**
Town of East Gwillimbury
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Heritage Green Landscape Contractors
Ancaster, ON

**Stephen Miller**
Stephen C. Miller and Associates Ltd.
Malagash, NS

## Odds and Ends

**STA Membership Plaques**
Display membership plaques are available in executive engraved walnut for $50 plus S&H. To order, contact Lee at the STA office.

**Summer 2006 Submissions**
If you have something you'd like to submit for the next issue, please forward it to the STA office by April 21, 2006.

**Editorial Content**
Opinions expressed in articles published in *Sports Turf Manager* are those of the author and not necessarily those of the STA, unless otherwise indicated.

# Ontario Turf Industry News

OPA ANNOUNCES NEW EXECUTIVE DIRECTOR, KATERINA JORDAN A KEY ADDITION TO U OF G TURF RESEARCH TEAM

### John Howard Steps Down From OPA

It is with a mixture of happiness and sadness that the Ontario Parks Association announces the resignation of John Howard as Executive Director.

After five and one-half years of dedicated service and hard work, John has accepted a position as Superintendent of Parks with the City of Owen Sound. This is a wonderful opportunity for John to return to his roots in parks maintenance and we couldn't be happier for him and his family.

John has accomplished a great deal during his time with OPA and the board and membership have all benefited from his contribution. Just like our organization, the City of Owen Sound will prosper immediately from John's experience, commitment to hard work and contacts throughout the green industry.

Please join us in congratulating John on his new post, which he began on February 13. The OPA Board of Directors has some rather large shoes to fill as a result of John's departure so we ask for your patience during this period of time.

### OPA Welcomes Eric Trogdon

The Board of Directors of the Ontario Parks Association is pleased to announce the appointment of Eric Trogdon as Executive Director of the Association.

Eric lives in Dundas, Ontario and has over 25 years of experience in parks and recreation and has extensive experience in education, law enforcement and working with public and private sector organizations both in Canada and the United States. Eric looks forward to meeting and working with you in the future.

Please join us in welcoming Eric to the Ontario Parks Association. Eric can be reached at 905-864-6182 or by email at opa@opassoc.on.ca.

*Editor's Note: Congratulations to both John and Eric from all of us at the STA!*

### Generous Donation Made to OTRF

The Ontario Turfgrass Research Foundation wishes to acknowledge the generous contribution of $10,000 made by the Green Horizon Group of Farms and the Schiedel Family. Green Horizon has been producing quality sod for over 30 years. The OTRF has initiated an aggressive fund raising campaign supporting the two new turfgrass faculty members hired by the University of Guelph. Dr. Eric Lyons and Dr. Katerina Jordan join Dr. Tom Hsiang taking the Guelph Turfgrass Research Institute to the forefront of Canadian turfgrass research. We invite all industry representatives to support this cause. For more information, email Research Director c.almack@sympatico.ca.

## Introducing Katerina Jordan at U of G

I am a newly appointed faculty member in the Department of Plant Agriculture at the University of Guelph and am writing to introduce myself and give you an idea of what I am hoping to accomplish for the Ontario turfgrass industry. I am originally from the United States and was born in Maryland where I attended both undergraduate and graduate school for my master's degree. Although I was trained as an agricultural plant pathologist both in school and at the United States Department of Agriculture, I have had an interest in turfgrass and turf management for over a decade. I recently attended the University of Rhode Island, where I completed my doctorate research on plant-parasitic nematodes on golf course greens turf. I am an avid golfer and enjoy sports of all kinds and like the idea of being able to combine my career with my personal interests. Most importantly, I am fascinated with the performance that today's turfgrass cultivars are able to give turfgrass managers, and am excited about researching management methods of these resilient plants.

One of the major problems I see for turf managers today is maintaining turfgrass at the especially high level necessary to meet the increasing demands of the end users. Without an excessive reliance on chemical inputs, it is often difficult to meet these needs while keeping turf alive. My research focus in Guelph will be to develop and test turfgrass management methods aimed at reducing chemical inputs while maintaining high quality turf. With the proper combination of targeted breeding and a willingness to focus on cultural practices for pest reduction and general maintenance, I believe that it is possible to reduce the total amount of chemical inputs on turf. This would eventually lead to cost reduction for turf maintenance, and would reduce any negative environmental impacts that managing turf may have. My specific plan of action is to look at a variety of organic amendments and potential biological controls to improve overall plant and soil health, and to evaluate different turfgrass species and cultivars than those principally used today. My graduate student, John Watson, will be conducting a study on establishment and management of velvet bentgrass beginning this spring.

My second priority is to continue some of my nematode research on turfgrass in Ontario. The results I obtained in New England lead me to believe that plant-parasitic nematodes may be more problematic on highly maintained turf than might be expected in this area, especially considering the similarity in climate between the two regions. Understanding the potential threats that lie beneath the soil's surface may allow turfgrass managers to more effectively manage their turf. Specifically, I hope to evaluate potential threats from nematodes through extensive soil surveys throughout the province and to assess various factors that may influence population levels of plant-parasitic nematodes. I am also interested in evaluating various cultural and biological control measures aimed at decreasing both nematode population levels and the symptoms they can cause on highly maintained turfgrasses.

Finally, I will be overseeing the Turfgrass Diagnostic Clinic housed at the Guelph Turfgrass Institute. Working with Erica Gunn, the technician who has been operating the clinic, I hope to continue the excellent service that has been offered to superintendents and other turf managers in the past while making some improvements that will hopefully better serve the industry. We are adding nematode screening to our list of services in the hope that we may be able to answer some questions when fungal diseases are not the cause of visible symptoms. We will have specific instructions for submitting samples for nematode counts on the website this coming spring. We are also going to include management program recommendations for your specific problem at the time of diagnosis, making sure to include a combination of cultural and chemical methods that are available for treatment of your turf. Finally, if we are unable to determine the cause of your problems in the lab, I will do my best to make myself available for on-site visits to evaluate ongoing issues you may have. We hope that these improvements will help us at the GTI better serve your needs as we enter the 2006 season.

Ultimately, my goal in this position is to aid the turfgrass industry in solving whatever problems arise with each season. There is no doubt that being a turfgrass manager is never a boring job, as once you think you have one problem solved, another one is sure to pop up. Weather, wear and the demands of the end users all affect how turf will thrive through a growing season. As each of these parameters is extremely dynamic, it is difficult to predict what problems will be encountered each year. That combined with increased pressure to reduce chemical inputs makes the job of a golf, sports or sod turf manager extremely challenging.

In order to best address the needs of the turfgrass industry in Ontario, it is important to talk to the people who are directly involved. Therefore I plan to try to meet or at least speak with as many of the turfgrass managers in the area as possible before really starting my research program. I hope that those of you reading this article will be willing to share your concerns with me and that together we can work to make your lives just a little bit easier. I have included my contact information below and welcome your calls or visits should you have a problem that needs to be addressed.

Before I close, I would like to thank the department of Plant Agriculture for their commitment to turfgrass research by supporting my position and my technician Alex Porter. I would also like to express my great appreciation to the OGSA (Ontario Golf Superintendents' Association) and the OTRF (Ontario Turfgrass Research Foundation) for providing me with research funding in the form of start-up monies.

I look forward to meeting with many of you and to continuing to foster the positive relationship that already exists between the University of Guelph turf program and the Ontario turfgrass industry. I can be reached at 519-824-4120 (x 56615) or at kjordan@uoguelph.ca, and have an office on the Guelph campus in 1237 Bovey Building. ♦

— *Green is Beautiful*, February, 2006

ONTARIO Turfgrass SYMPOSIUM

# Making the Most of Your Diagnostic Dollars

ERICA GUNN, RESEARCH TECHNICIAN, GUELPH TURFGRASS INSTITUTE, GTI TURF DIAGNOSTICS

There are many things to consider when you are sending in a turf sample to be analyzed at GTI Turf Diagnostics. Each sample requires a history and you must supply important background information. When submitting your sample, you need to give us all of the details you can about that sample and the area it comes from. That information will help us with the diagnosis and will help you get the best results.

To begin we need you to start compiling information when symptoms first appear. Symptoms can vary greatly depending on the issue at hand. The very first thing to figure out is what turf species is being affected. This is a key factor. Symptoms may be affecting only one species, as there are some diseases and insects that have specific hosts. An example of that would be necrotic ring spot affecting primarily Kentucky bluegrass. However, if all species in the area are being affected this may indicate a pest with a broad host range or an abiotic (non-living) factor such as drought, nutrient deficiency, fertilizer burn, localized dry spot, etc.

Once you look more closely at the symptoms, take note of the shape at which the symptoms are appearing in the turf area. Spots, rings or general thinning could be a disease or insect pest. Irregular patches could represent some disease spots that are coalescing or insect damage. A more regular or random pattern would be more indicative of mechanical issues such as equipment failing to overlap spray patterns, fertilizer burn or a hydraulic leak. The part of the plant being affected, the leaves or roots, is another important consideration.

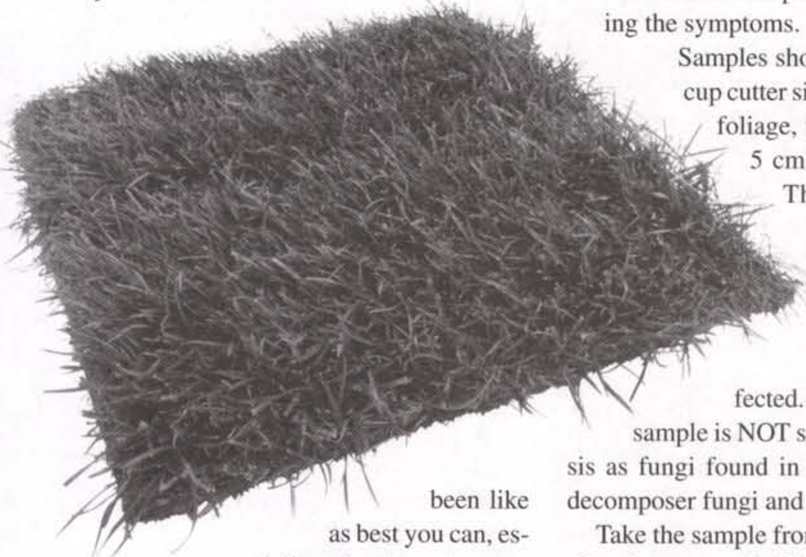
Next you need to answer some important questions. What is the environment like in that turf area? Is the area near a sidewalk or driveway? Under the heat of the summer sun a turf area can dry out more quickly in those areas. Is there a lot of wind? Wind can suck a lot of extra moisture from turf plants. Is there a lot of shade? Is there a slope and are the symptoms at the top or bottom of the slope? The top of a slope tends to dry out more quickly and the bottom may be wetter. Are there any drainage issues?

Take a closer look at your symptomatic turf by cutting out a small piece. Do you notice anything unusual about the sample? How is the soil? Does it fall away indicating perhaps a lack of moisture or is it compact and heavy? How is the thatch? Is there a foul odour? Did insects fall out of the sample as you lifted it out of the ground? Do you see any insect frass or tunneling? Does the turf pull away easily, which is indicative of grubs feeding on the roots?

Think about the cultural practices that have taken place recently. What is the mowing height – has the area simply been scalped? What is the mowing frequency? Has the turf been fertilized recently? Certain diseases favour high nitrogen while others favour low amounts of nitrogen. Has the turf been irrigated recently? Some diseases intensify with irrigation or with none. Have there been any pesticides applied recently? Has there been any core-aeration? Some insect pests inhabit aerification holes and some diseases need the turf to be wounded to infect the plant.

Once you look more closely at the symptoms, take note of the shape at which the symptoms are appearing in the turf area.

Another important thing to consider is of course the weather. Different diseases and insects appear at different times throughout the year. Some diseases require high humidity, excess water, snow cover, high day time temperatures, or high night time temperatures, etc. Pathogens sometimes spread with moisture and then cause symptoms when the area is dry. Depending on your geographic location, it's very important to let the lab know what your weather has been like as best you can, especially at the time when you first notice the symptoms. Also, take note if the problem is getting worse or improving under certain weather conditions.



When in doubt, send in a sample for analysis. Make sure you get a senior turf manager to look at the sample before you send it in just to be sure they can't solve the problem on their own. By sending in a sample you'll be able to provide the proper treatment, either chemical or cultural, and could save time and money in the long run. Also, by having a diagnostician look at your sample, management issues may be discovered.

Always take your sample before you treat with fungicides as fungicides do their job and destroy the pathogens. Otherwise this really makes diagnosing impossible as we need to see the pathogen that is causing the symptoms.

Samples should be 10-15 $cm^2$, cup cutter size is ideal. Include foliage, thatch and at least 5 cm of roots and soil. The sample should show a range of symptoms from healthy, slightly affected to severely affected. A completely dead sample is NOT suitable for diagnosis as fungi found in dead turf may be decomposer fungi and not the real cause.

Take the sample from the outside edge of a ring or patch. If the symptoms are general, take the sample from an area where they are of intermediate severity. Try and submit your sample as soon as possible. If you take a sample, please send it in the same day. If that is not possible you can store it in a cooler or fridge overnight. Wrap the sample in newspaper and then in a plastic bag and place it in a sturdy box. Do not add water and do not allow the sample to dry out or be exposed to excessive heat or cold. Please do not send over a weekend or by mail. Same day courier service or dropping it off at the lab is the best for an accurate timely diagnosis.

Please make sure you fill out the sample submission form as completely as possible. Your sample is just a fraction of the size of the total turf area under your care and it may be difficult for us to diagnose your problem if we can't see the bigger picture. If you provide us with the most information you can, it will help us to diagnose the issue at hand and make the best recommendation for management. All of the questions and considerations mentioned pertain to us as well, so help us help you!

For more information about sending in a sample, submission forms and payment options, please visit GTI Turf Diagnostics: www.uoguelph.ca/GTI/turf_diag. You can also contact Erica Gunn, egunn@uoguelph.ca or Dr. Katerina S. Jordan, kjordan@uoguelph.ca. For information with regards to pest issues and IPM, check out OMAFRA Publications 162 and 816. ♦

## QUOTABLE QUOTE

There is nothing like looking, if you want to find something. You certainly usually find something, if you look, but it is not always quite the something you were after.
*~ J.R.R. Tolkien, 1892-1973.*

# A Grab Bag of GTI Research Results – Cover Story Continued

KEN CAREY, ERIC LYONS, ERICA GUNN, ALEX PORTER, PAM CHARBONNEAU, DEPART. OF PLANT AGRI. AND GTI, OMAFRA

and detergent (30 ml of each / 5 L solution) and direct harvest of the larvae from cup-cutter soil cores. We then tested the experimental material in the greenhouse on larvae in pots of perennial ryegrass, and in the field on Kentucky bluegrass. We were working with field plots infested with quite high levels of late instar larvae (>800 per m$^2$) (see photo below), but none of the 4 experimental granular treatments we tested had a significant effect on the field populations or on the larvae in the greenhouse. We've applied the material (fall 2005) to some early instar larval populations in creeping bentgrass and will examine these populations again this spring

**Above:** Applying experimental granular product to leatherjacket-infested plots of Kentucky bluegrass. Inset: Leatherjacket driven to the surface by the irritating o-dichlorobenzene drench.

### NTEP 2005 Kentucky bluegrass cultivar trials

GTI has joined the most recent Kentucky bluegrass trial from the National Turfgrass Evaluation Program – along with many research cooperator sites in the U.S. In the trial are 110 commercial and experimental varieties, seeded at the GTI in September 2005, which will be evaluated for five years (see front page photo). We already have data from the germination and establishment phase of the trial, and will get spring greenup and winter survival data shortly. We're "fortunate" that we've had a bit of ice cover on the plots this winter, so we may see some interesting differences in survival – especially on the Texas bluegrass entries which are included in the trial.

### Wetting agent trials on creeping bentgrass turf on high sand rootzones

Two trials, one a new trial and one in its third year, looked at efficacy of wetting agents at reducing localized dry spot on creeping bentgrass on high sand putting greens. These trials provide data which can be used for registration of wetting agents, which is required for such supplements under the Fertilizer Act. Because we did not have a particularly stressful (dry) summer at the GTI (between rainfall and regular irrigation on the green), we did not see much localized dry spot on the trial plots. We were able to detect significant improvements in the rootzones when the wetting agents are used, based on the hydrophobicity or "wettability" of soil cores taken during the season.

### Organic amendments

We ran four different trials at the GTI in summer 2005 looking at various organic amendments or organic fertilizer programs on turf. These included products that are not NPK fertilizer but may provide some growth benefits (biostimulants) – Greenstreme, a hydrolyzed fish waste material and Hygrozyme, a biostimulant. These materials were applied to creeping bentgrass putting green turf, with and without NPK fertilizer, to determine their effects on turf performance. Another trial looked at palletized alfalfa (Alfalfa Green) applied as an amendment on newly seeded Kentucky bluegrass, compared to an equivalent standard NPK fertilizer. Alfalfa contains a natural growth regulator (triacontanol) which has shown some benefit in other crops during the germination and establishment period. The final trial looked at the performance of liquid organic fertilizer programs on Kentucky bluegrass turf, comparing 6 different materials which combine NPK fertilizers with various combinations of humates, iron and biostimulants, again in comparison to an industry standard NPK treatment.

Many of these products provided performance equivalent to the industry standard materials with which they were compared, though there were no outstanding breakthrough performances from the organics.

Spring ratings of most of these trials will be followed by compilation of the data for the Annual Research Reports. Some of the trials are complete, some are ongoing, and some will lead to further research in new trials. If you'd like to see the trials live and speak to the researchers in person, watch for details of the 2006 GTI Research Field Day where these and similar trials will be on display. ♦

## A SPECIAL *ST MANAGER* PULL-OUT SECTION

HELMUT SPIESER, OMAF

# Turf Jargon

### Soil Science Terminology from A-Z.

There are many strange-sounding words used in the world of sports turf. Although most of these words may have originated from the 'Ivory Towers,' they often end up as commonly used lingo amongst practitioners. To ensure we are all speaking the same language, and as a means of refreshing our understanding of sports turf terminology, we will attempt in this article to define some of the more commonly used scientific terms.

**Acids.** Ions which lower the soil pH, such as hydrogen ($H^+$) and aluminium ($Al^{3+}$).

**Acid soil.** A soil with a pH below neutral (neutral pH = 7.0). Most turf soils are somewhat acidic.

**Alkaline soil.** A soil with a high pH, above pH 7.

**Anaerobic soil.** A soil lacking in oxygen. Under such conditions only some species of organisms, such as anaerobic bacteria, can function. Anaerobic soils often appear discoloured (mottled) and have a pungent (rotten eggs) odour.

**Anion.** A negatively charged ion or nutrient, such as chloride ($Cl^-$) and nitrate ($NO_3^-$)

**Air-filled porosity.** The proportion of a soil's volume that is filled with air at a given time; a low air-filled porosity indicates poor aeration and restricted drainage.

**Amendment.** Any substance added to a soil/sand medium for the purpose of altering the soil characteristics (e.g. peat or gypsum).

**Base.** Ions which raise the soil pH, such as calcium ($Ca^{2+}$) and magnesium ($Mg^{2+}$).

**Base saturation.** The extent to which the nutrient holding sites in a soil are occupied (saturated) by bases. Usually expressed as a percentage of the total cation exchange capacity. Total Base Saturation = Ca + Mg + K + Na/CEC.

**Bulk density (soil).** The mass (weight) of dry soil per unit volume of soil. A high bulk density generally means less pore space.

**Calcareous soil.** A soil with a high calcium carbonate level. These soils usually have a high pH that is difficult to lower.

**Calcined clay.** Clay/soil minerals that have been 'fired' at high temperatures to produce stable, granular particles.

**Cations.** Any positively charged nutrient, such as potassium ($K^+$), calcium ($Ca^{2+}$) or magnesium ($Mg^{2+}$).

→ page 12

**Cation Exchange Capacity (CEC).** A measure of the exchangeable (potentially plant available) cations that a soil can hold against leaching. Sands typically have a low CEC, which means they have only a small nutrient supply store. CEC is generally expressed in milli equivalents per 100g of soil.

**Cleavage plane.** *(Sorry to disappoint here...)* A separation layer in a soil, often resulting from using topdressing material of different texture to the base soil.

**Field capacity.** The amount of water held in a soil at the point where drainage ceases; represents the upper limit of water available to the plant.

**Gleying.** The development of greyish colours and reddish stains (mottles) under anaerobic (poor drainage) soil conditions.

**Humus.** The stable organic fraction in a soil; it is an advanced stage of decomposition and is unrecognisable as being of plant origin.

**Infiltration rate.** The rate at which water enters the soil surface. The rate of infiltration can be measured using an infiltrometer.


**Leaching.** The removal of nutrients and other materials through the soil in drainage water.

**Loam.** A textural class of soil which has a relatively similar sand, silt and clay content, such that no one fraction dominates.

**Macronutrient.** A chemical (e.g. N or P) that is used in relatively large amounts (usually $>500$ ppm in a plant).

**Mat.** A tightly intermingled layer of roots, stems and other living and dead plant material at or near the surface.

**Micronutrient.** A chemical (e.g. Cu, Fe) that is used in very small amounts ($<50$ ppm in a plant).


**Mineralisation.** The conversion of an element from an organic form to an inorganic state, as part of microbial breakdown.

**Mycorrhiza.** Literally means "fungus root" and is a specific fungi associated with the roots of certain plants.

**Nitrification.** The biological oxidation of inorganic nitrogen (as ammonium) to form nitrate nitrogen ($NO_3 - N$). An important process in the production of plant available nitrogen.

**Nitrogen and nitrogen cycle.** Nitrogen is the most significant nutrient in the turf system; there are different forms of nitrogen in a soil system, including nitrate, ammonium and organic nitrogen forms. The nitrogen cycle refers to the changes that occur with the form of nitrogen as it moves between the soil, plant and atmosphere.

**Nutrient.** A substance required and taken up by the plant (or any other organism) for growth, such as the essential elements (N, P K, S, etc.).

**Organic matter.** Any matter in the soil system that is in the organic form, generally arising from the debris of plants or animal residues. Thatch and mat are major components of soil organic matter in turf systems.

**Organisms.** The living fraction in a soil, including fungi, bacteria, actinomycetes and larger groups such as earthworms.

**Pan.** Any layer or horizon in the soil that impedes downward movement of water, air or root development. Pans can be created naturally with fine-textured or layered profiles, or can be artificially created, such as cultivation or core pans.

**Parent material.** The relatively unaltered substrate located below the sub-soil from which the soil profile has developed by weathering and other processes.

**Peat.** A soil high in undecomposed (or slightly decomposed) organic matter, which accumulates under conditions of excessive moisture (no air for microbial activity and organic breakdown).

**Ped.** A soil aggregate or unit of soil structure (e.g. crumb nut or block).

**Percolation.** Another term for drainage, or the downward movement of free water through the soil profile.

**Permeability.** The ease with which water, air and plant roots can move down through the soil profile. Is a more subjective term for drainage than "hydraulic conductivity."

**PH.** A measure of the amount of hydrogen ($H^+$) ions in a soil, which in turn determines soil acidity or alkalinity.

**Pores.** The holes or voids in a soil that give rise to the soil drainage (macropores) and water retention (micropores) characteristics.

**Porosity.** The percentage volume of a soil that is not occupied by solid particles (will be occupied by water or air).

**Rhizobia.** Bacteria able to live symbiotically (in a mutually beneficial relationship) with roots of legumes and which are capable of using ("fixing") atmospheric nitrogen.

**Rhizosphere.** The biologically active zone of soil containing the bulk of plant roots and soil microorganisms.

**Saline soil.** A soil with a high soluble salts level. Under such conditions plants struggle to extract water and as such suffer "dry wilt."

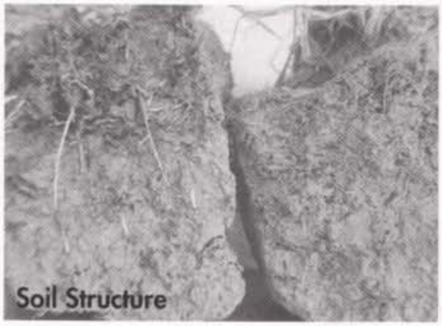
**Self-mulching soil.** A soil that when re-wetted tends to swell and break down to defined, stable aggregates. Applicable to clay soils and is relevant to cricket clay selection.

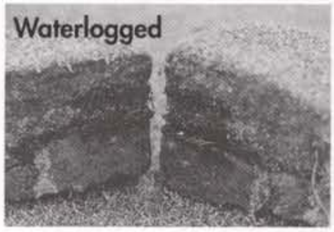
**Sodic soil.** A soil with a high sodium ($Na^+$) level relative to the level of divalent (++) cations, such that plant growth (and soil drainage rate) is impaired.

**Sodium Absorption Ratio (SAR).** An index to express the relationship between the level of sodium ions and the divalent cations in a soil..

$$SAR = \frac{\sqrt{Na}}{Ca+Mg}$$

**Structure (soil).** How the individual soil particles are bound together to form aggregates or peds. Structure is described in terms of aggregate shape, size and strength (e.g. moderately developed, fine crumb).


Soil Structure


Waterlogged

**Texture (soil).** The relative proportions of particle sizes (sand, silt or clay) in a soil sample (e.g. silt loam, fine sandy loam).

**Tensiometer.** A device for measuring the availability of soil water (or matric potential). It consists of a porous ceramic cup connected to a vacuum gauge.

**Tilth.** The physical condition of a soil as it relates to the ease of tillage (cultivation) and the impedance to seedling emergence.

**Trace elements.** Another term for micronutrients, or essential nutrients used in only small quantities by the plant.

**Transpiration.** Loss of water by the plant to the atmosphere via the stomata in the leaf.

**Waterlogging.** Excessive soil moisture to the point where the soil tends to an anaerobic condition.

**Weathering.** The aging of a rock or soil by natural processes, such as wind, rain and microbial activity.

**Wilting point.** The soil moisture content at which the plant starts showing symptoms of moisture stress. ♦

*— Keith McAuliffe, CEO, NZ Sports Turf Institute, Palmerston North*


**Acknowledgement**

Reprinted from the *New Zealand Turf Management Journal,* February, May and November 2005.

# INDUSTRY PRESS RELEASES

NEWS FROM ZANDER, G.C. DUKE, MOUNTAINVIEW AND HUNTER

### Zander Merges With M. Smilsky

Zander Sod Co. Limited, Kettleby, Ontario, is pleased to announce its recent merger with M. Smilsky Limited of Cookstown, Ontario. Larry and Jim Smilsky, owners and operators of M. Smilsky Limited over the past 50 years, have contributed greatly to the sod industry and the community and plan on semi-retiring after the transition.

Zander Sod Co. Limited, with the addition of the Smilsky employees, acreages and equipment, will become the area's largest sod producer and distributor of Kentucky Bluegrass and golf course specialty grasses.

Both Zander Sod Co. Limited and M. Smilsky Limited were founded on the basis of supplying top quality products with excellent customer service. Through the transition and afterward, we will continue this tradition of ensuring that our customers are highly satisfied. For more information, visit www.zandersod.com.

### Eastman 21" Infield Striping Mower Available From G.C. Duke Equipment

For beautiful striping, get the Eastman Model ST21K Self Propelled Rotary Striping Mower. This Eastman mower has a heavy duty steel rear roller that creates a 21" striping effect. The mower is powered by a 6 hp Kawasaki engine and has a shaft driven transmission. Standard with the unit is an "easy lift" 2.1 bushel nylon mesh grass catcher. This mower features blade brake assist and vacuum fan assist for superb cutting and collection. High lift steel blades adjust to seven positions providing 1/2" to 3" height of cut. Contact G.C. Duke Equipment Ltd. for more information at 905-637-5216, www.gcduke.com.

### New Products From Mountainview

Mountainview is proud to offer a technology that uses *only super heated water* to non-selectively eradicate unwelcome vegetation. The extreme heat of the water immediately destroys the cellular structure in the vegetation *killing the plant on contact.*

The AQUACIDE™ process of vegetation control provides a dependable alternative to chemical herbicides while keeping in mind concerns for human and environmental safety with non-chemical vegetation management process. Available to buy or rent with or without operators.

New to the Mountainview fleet is 4700 XL Cherrington Beach Cleaner / Soil Screener. Our machine screens 6" deep and is perfect to remove lake weeds, dangerous debris, medical waste, glass, rocks and shells, litter, trash, animal droppings… even cigarette butts! Give your beach patrons a safe and pleasing recreational experience they'll tell their friends about! Screens fields or rocks and debris before seeding. A must for horse racetracks.

Lastly, Mountainview is now the proud distributor of Wiedenmann deep tine aerators. Wiedenmann has a complete line of aeration equipment. The extreme ruggedness and the innovative designs of the Wiedenmann machines guarantee a permanent and economic operation. Available to buy or on a custom work basis with operator.

Want to know more? Visit our website at mountainviewturf.com or call us toll free at 1.800.260.5922.

### Hunter expands its legendary I-25 and I-40 rotor lines with new 6-inch models

As the market leader in worldwide sales of rotary sprinklers, Hunter Industries is expanding its legendary line by offering new six-inch models of its I-25 and I-40 rotors, offering a taller pop-up height for effective and efficient watering of landscapes with higher turf heights.

These new models, which provide all the features that have made Hunter's pop-up rotors the industry's best sellers, were introduced at the 26th Annual International Irrigation Show in Phoenix.

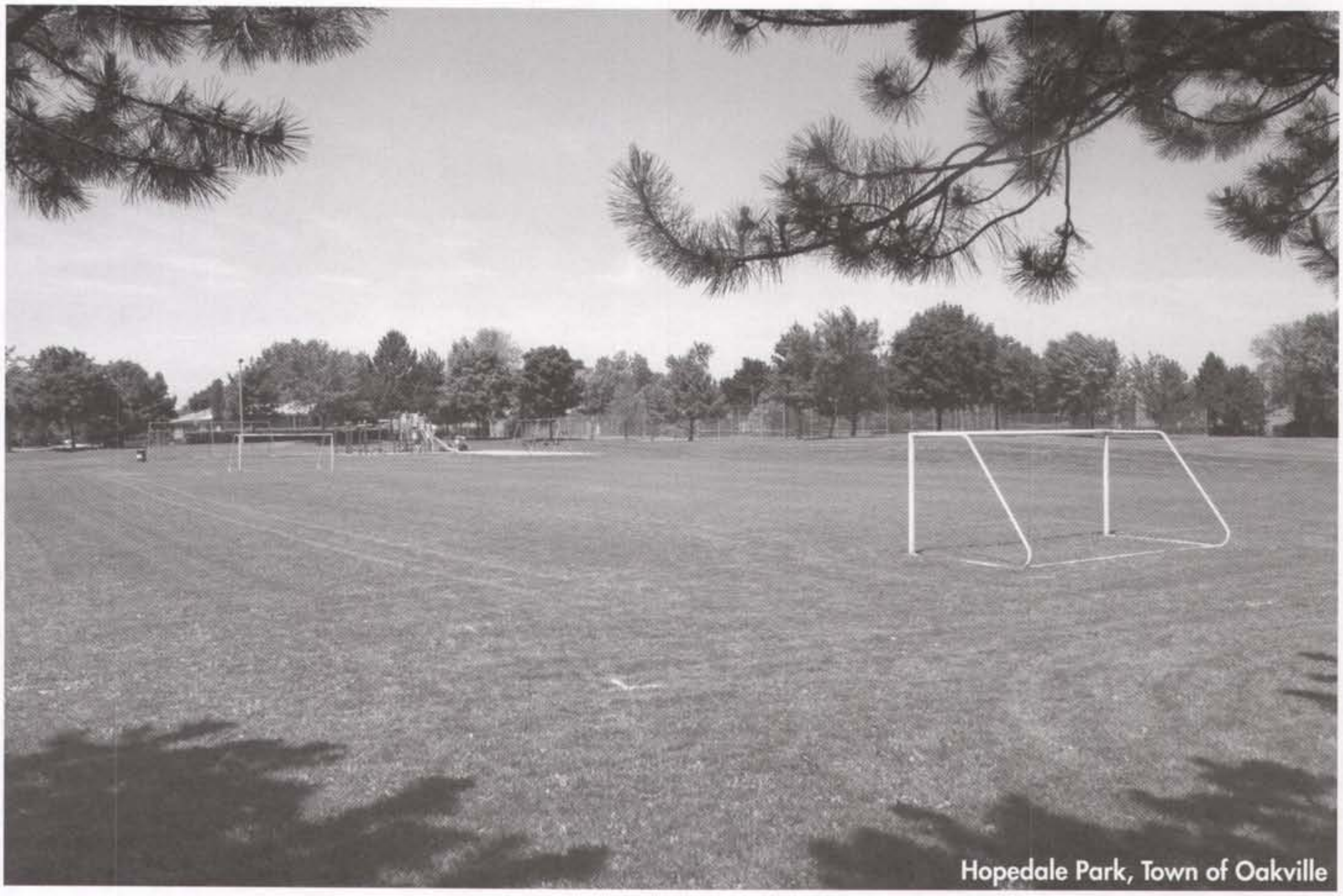
The new, tall pop-up versions are the perfect choice for grounds superintendents and athletic field managers who are now keeping their mow heights higher to promote stronger turf growth, especially throughout higher-temperature regions.

The addition of the new six-inch versions to the I-25 commercial-duty rotor and I-40 heavy-duty rotor portfolios join like sizes already offered in the PGJ and I-20 rotor, and the Pro-Spray and Institutional Spray lines.

The new six-inch versions have the same durable construction that has made the I-25 and I-40 the rotors of choice at sports complexes, parks, and campuses all over the world. Other notable features include:

- The ProTech™ safety system, with a small exposed cushioned rubber cover and boot to keep play areas safe, by keeping hard plastic away from the playing surface.
- Heavy-duty ribbed cap and body, to withstand tough turf traffic.
- Proven water-lubricated gear-drive, for years of service across a wide operating range.
- Factory-installed drain check valve, to save water and reduce liability.
- Optional opposing dual nozzles, a Hunter exclusive (standard on I40-36S-ON).
- Stainless steel riser, extends sprinkler life in coarse soils and provides a deterrent against sprinkler vandalism (standard on I-40, optional on I-25).
- Patented VStat® self-adjusting stator and heavy-duty retraction spring, for added dependability and durability.

Hunter is one of the world's leading manufacturers of irrigation equipment for landscape and golf. For more info, contact your local authorized Hunter distributor or visit www.HunterIndustries.com. ♦


Hopedale Park, Town of Oakville

ONTARIO Turfgrass SYMPOSIUM

# Competitive Turf: Overseeding for Weed Management

EVAN ELFORD, M.SC. CANDIDATE, DEPARTMENT OF PLANT AGRICULTURE, UNIVERSITY OF GUELPH

Weed management on athletic fields and in municipal parks is becoming increasingly important as traditional weed control measures, such as herbicides, become unavailable due to municipal legislation and changing public perception. Currently, 90 municipalities in Canada have banned or restricted the use of herbicides affecting over 8 million Canadians. Turfgrass managers must turn to cultural practices and optimise their efficacy to develop an effective integrated pest management (IPM) program that decreases or eliminates the need for herbicides. IPM programs with a focus on weed management are important in delivering a good quality and safe playing surface for user groups.

Overseeding, the practise of seeding a desirable turf species into an established turfgrass stand, is typically used to fill in bare areas and stabilize soil to create a uniform playing surface for athletes. Current overseeding practices typically use perennial ryegrass and Kentucky bluegrass to create a vigorous, wear tolerant playing surface. However, due to time restrictions and increased use of facilities, the potential to manipulate overseeding for weed suppression is not being realised. Research aimed at optimising overseeding as a weed management tool is currently under investigation at the University of Guelph. Thanks to funding by the Ontario Turfgrass Research Foundation (OTRF), NSERC and partnerships with the Municipality of Oakville and Pickseed Canada Inc., a total of seven field trials have been implemented at the Guelph Turfgrass Institute, the University of Guelph, and in the Municipality of Oakville.

Perennial ryegrass overseeding into pre-existing Kentucky bluegrass is being evaluated under low and high-use conditions and in non-irrigated and irrigated situations. Perennial ryegrass is quick to germinate and establish which is important when competing with weed species for light, water, nutrients and space. All plants compete for these four main elements and overseeding encourages a desirable turfgrass species to compete and establish as opposed to undesirable weed species.

The trials include evaluating three different rates of overseeding at 2, 4 and 8 kg/100 $m^2$ in all combinations with overseeding timing of May, July and September. Weed species are evaluated in each plot in May before treatments are applied, and re-evaluated in June, August and October. The predominant weed species documented during the 2005 season were perennials which included dandelion, clover, broadleaf plantain and narrow-leaf plantain. Kentucky bluegrass and perennial ryegrass populations are also being monitored for the duration of the study to examine the effects of overseeding on the turfgrass stand. One field season has been completed to date and preliminary results indicate that overseeding in both the spring and fall at any of the tested rates assists in reducing weed populations. The study will continue in the 2006 growing season.

Overseeding investigations are essential in determining the best management practices for an IPM system. Through the investigation of the appropriate application timing and rates, overseeding, in addition to fertility and mowing frequency, will provide an alternative form of weed management to decrease herbicide use while maintaining a safe playing surface for athletes. ♦

**Spring Overseeding at the GTI**

ONTARIO Turfgrass SYMPOSIUM

# Municipal Integrated Pest Management Lawn Demonstration Project

***FINAL REPORT*** OF 3-YEAR STUDY SPONSORED BY THE ONTARIO PESTICIDE ADVISORY COMMITTEE

## Objectives

1. To demonstrate the impact of conventional lawn care, IPM, no-pesticide and alternative herbicides on turf quality and pest infestations.

2. To document the results of maintaining turf without pesticides for a three year period.

## Study Description

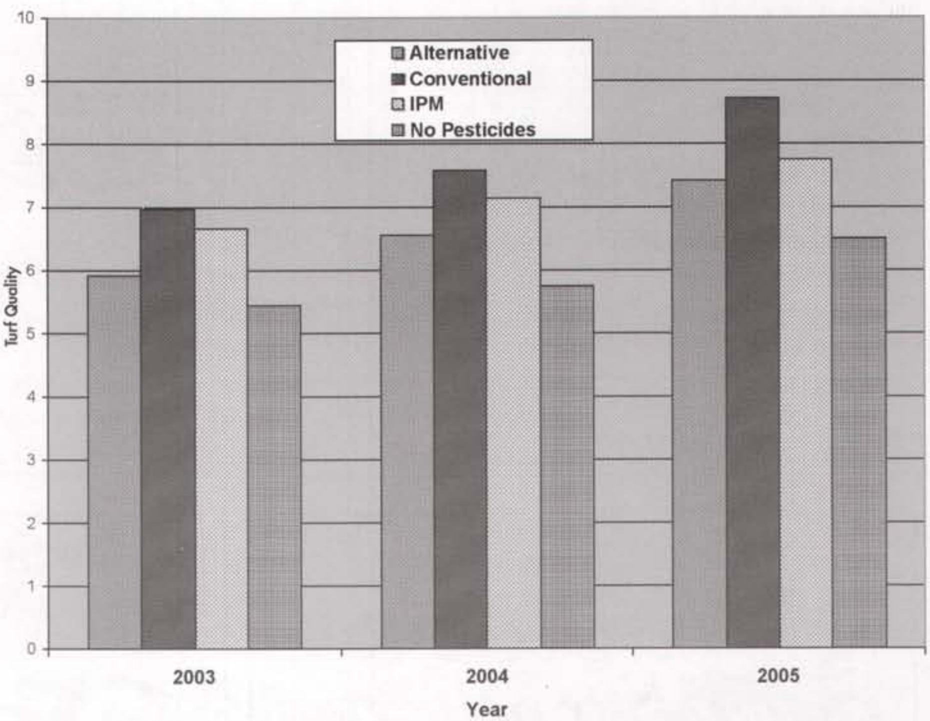
This study began in 2003 and continued on the same plot areas in 2004 and 2005. The study was established in three municipal settings: Guelph, Brantford and London. At Guelph, the plots were located at the Guelph Turfgrass Institute (GTI). There were 32 plots, 9x5.5 m each, with a total demonstration area of 1584 m$^2$ (Figure 1). There were four management programs and they include: conventional, IPM, alternatives and no pesticides. The conventional approach used pesticides exclusively for pest control (total of 6 applications). IPM plots were monitored for pests and treated with pesticides when thresholds were exceeded. The alternative management program used organic pesticides (corn gluten meal and Nature's Weed and Feed – beet juice extract in year 1 and 2 and Juicy Lawn in year 3) for weed control. Lastly, no pesticides were applied under the no-pesticide management program.

At Brantford, the plots were located at the Glenhyrst Art Gallery, near the Grand River. There were three management programs and they are as follows: conventional, IPM and no-pesticides. There were 24 plots, 7x5 m each, with a total demonstration area of 840 m$^2$. In London, the plots were located at Watson Park, near the Thames River. There were two management programs, IPM and no-pesticides, and the study consisted of 16 plots, 10x4.5 m each, with a total demonstration area of 720 m$^2$.

**Figure 1. Plot plan at the Guelph Turfgrass Institute, Guelph.**

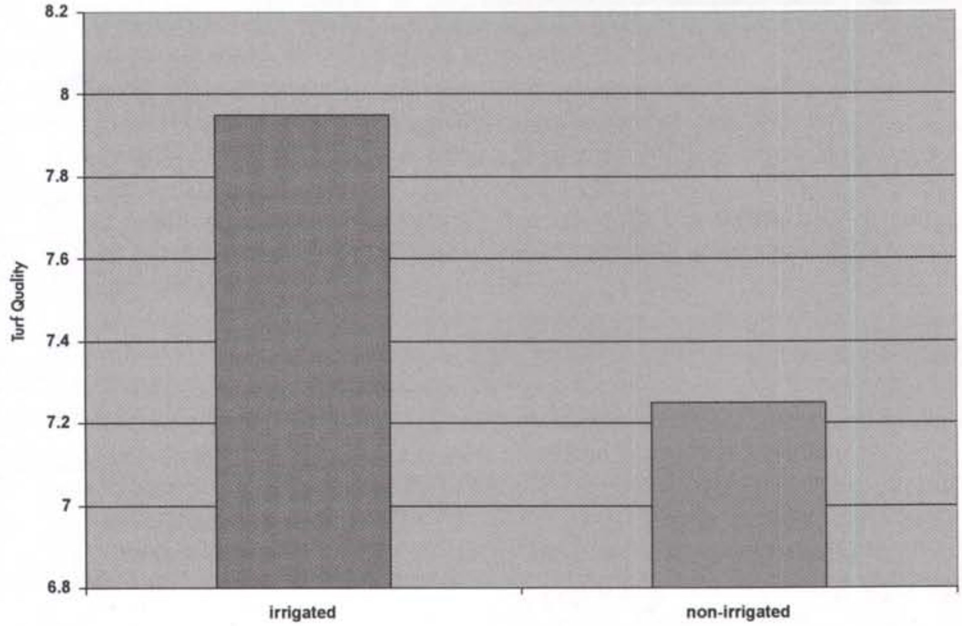
| Irrigated 4 cm mowing height | | Irrigated 8 cm mowing height | |
|---|---|---|---|
| **Fertility** | **No Fertility** | **Fertility** | **No Fertility** |
| Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides |
| **Non-Irrigated 4 cm mowing height** | | **Non-Irrigated 8 cm mowing height** | |
| **Fertility** | **No Fertility** | **Fertility** | **No Fertility** |
| Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides | Conventional<br>IPM<br>Alternative<br>No Pesticides |

**Figure 2. Influence of lawn care management on turf quality at GTI in 2003, 2004 and 2005.**




In all three municipal settings, the demonstration trials were set up on established, predominantly Kentucky bluegrass turf with an existing moderate level of weed infestation. The plots of each demonstration trial were divided into four lawn care management programs: conventional, IPM, alternative and no-pesticide. Within each management program, the plots were subdivided into three superimposed treatments including fertility (2.0 kg/100 m$^2$ of nitrogen annually vs. no fertilizer), mowing height (4 cm vs. 8 cm) and irrigation vs. no irrigation. The purpose was to demonstrate the effect that these treat-

Figure 3. Effect of irrigation on turf quality at GTI, 2005.



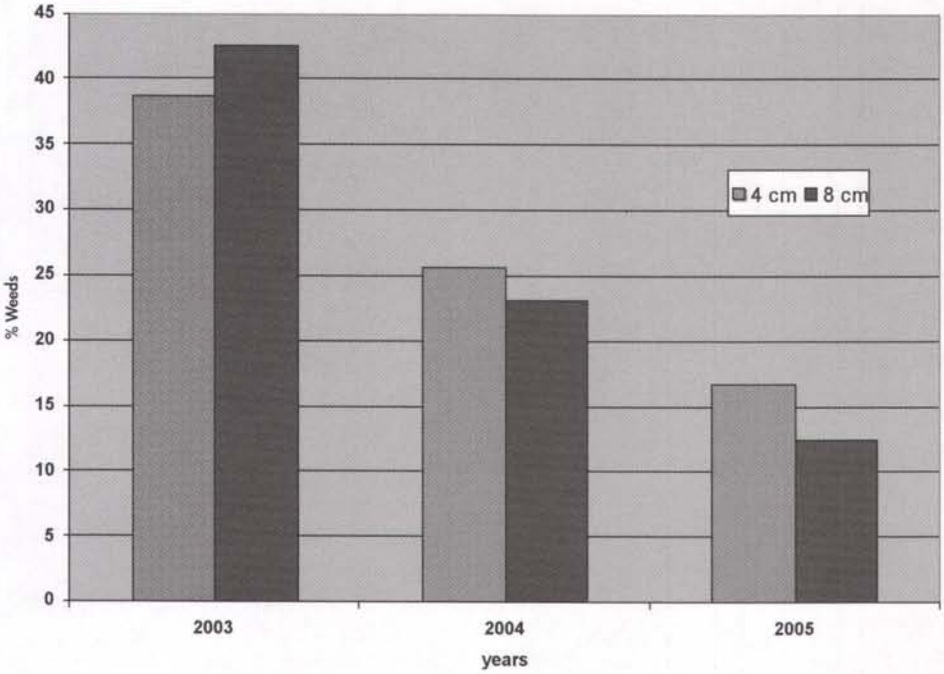

ments had on turf quality and pest levels. The amount of irrigation was based on rainfall values. If less than 2.5 cm of rain fell per week, the plots received irrigation to make up the deficit. However, due to the large amount of rainfall in 2003 and 2004, almost no irrigation was necessary and we were unable to demonstrate irrigation versus non-irrigation effects. For those two years, the irrigation and non-irrigation plot data were combined. In 2005, there were several weeks at each location that did not receive 2.5 cm of rain and irrigation was necessary. The trial started at all three locations at the beginning of June and continued until mid-November in all three years. Visual ratings and mowing were carried out weekly while the application of fertilizers, the monitoring of pests, and the application of pest control were carried out according to each of the four management programs and their superimposed treatments. The schedules of pest monitoring, treatments, pest monitoring techniques and amount of time spent monitoring is summarized in previous articles in the *Sports Turf Manager* (Summer 2004, Spring 2005 and Winter 2005). Results at all three sites were very similar. Results from GTI are presented here in an effort to save space. The full report will be available on line this spring at www.gti.uoguelph.ca/OPAC. In addition, it must be noted that this trial was for demonstration purposes only and was not set up to be analysed statistically.

**Results – Guelph Turfgrass Institute**

*Turf Quality*

The turf quality was consistently highest in the conventional plots, followed closely by the IPM plots, alternative plots and the lowest quality was consistently in the no-pesticide plots (Figure 2). Over the duration of this study, the quality of all

**Figure 4. Influence of mowing height on broadleaf weed infestation at GTI, 2003, 2004 and 2005**




management types increased with each successive year. There was very little effect of mowing height on turf quality over the three years of the study. The lower mowing height resulted in a slightly denser turf. There was a slightly larger effect of fertility on turf quality. The fertilizer treatment had an effect on turf density and colour which are two of the three parameters which are averaged to come up with turf quality. Uniformity is the third parameter that was measured and these three are averaged to determine an overall turf quality rating.

In 2005, we were able to demonstrate the influence of irrigation on turf quality (Figure 3). The overall quality of the irrigated plots was higher than the non-irrigated plots. The non-irrigated plots were fully dormant during June and early July.

*Broadleaf Weeds*

To determine the influence of mowing height, fertility and the alternative herbicide products on broadleaf weed infestation, only the no-pesticide and alternative plots were considered because both the conventional and IPM plots received broadleaf herbicides to control the weeds. Mowing height had a small effect on the percent broadleaf weed cover but it had less of an effect than fertility (Figure 4 and

**Figure 5. Influence of fertility on broadleaf weed infestation at GTI, 2003, 2004 and 2005.**

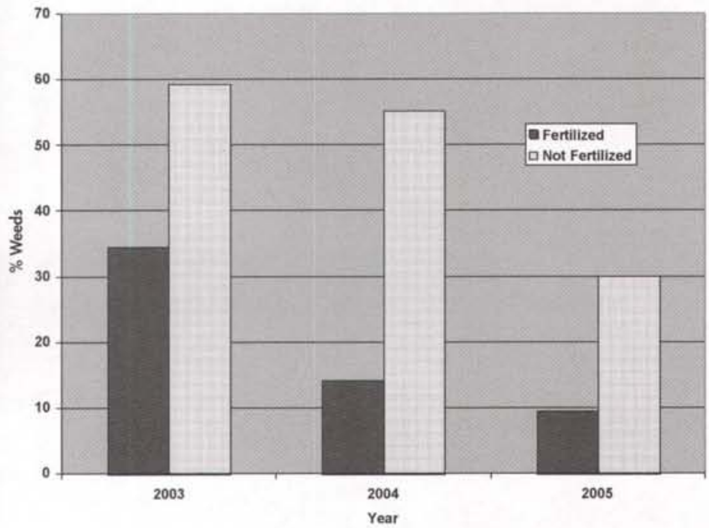
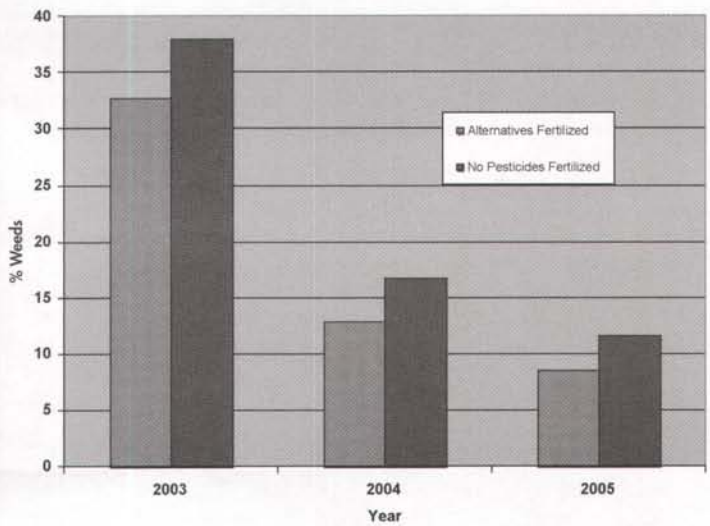



**Figure 6. Effect of alternative herbicide treatments vs. fertility alone on broadleaf weed infestation at GTI, 2003, 2004 and 2005.**




5). There were slightly more broadleaf weeds at the higher mowing height in 2003 and slightly fewer broadleaf weeds at the lower mowing height in 2004 and 2005. With the addition of 2.0 kg of nitrogen per season in 2004 and 2005, we were able to keep the broadleaf weed cover below the OMAFRA threshold of 10-15%. At this level of weed infestation, spot treatments alone can be used.

A comparison was made of the alternative plots and the no-pesticide fertilized plots (Figure 6). The purpose of this comparison was to separate the fertility effect of the alternative herbicide treatments (corn gluten meal contains 8% nitrogen and the beet juice extract products, Nature's Weed and Feed and Juicy Lawn, contain 7% and 15% nitrogen respectively) from the herbicidal effects. There was a slight reduction in percent broadleaf weed cover consistently each year with the combination of corn gluten meal and beet juice extract treatments. Because of the trial design, we are unable to determine which of these two treatments are responsible for the reduction in broadleaf weed cover, but we do know that application of both of these products together does result in a reduction of weeds. This could be due to the suppression of germination of broadleaf weeds seeds from the corn gluten meal or some suppression of established broadleaf weeds from the beet juice extract or from the nitrogen contained in these products. It is also suggested from this data that it may take more than one year of application of these products to realize a reduction in broadleaf weeds. After three years of application of the combined alternative products, the result was an overall broadleaf weed cover of less than 10%. It should be noted however, that the addition of fertilizer alone also reduced weed cover to a similar level.

At the beginning of the study at GTI, there was an average of 15-20% weed cover in all plots. Examining the no pesticide/no fertility plots, there was a rapid rise in the weed population to just under 60% by November 2003. There was a plateau at this level throughout the 2004 season until September 2004 when weed cover dropped below 50% and rose again in late fall. Over the 2005 season, weed levels dropped off throughout the season ending off at 30%. It is possible that the dry weather in the spring and summer of 2005 inhibited the germination of new weed seeds or that the drought had an adverse effect on the perennial broadleaf weeds.

In 2005, the plots at GTI, Brantford and London were irrigated. The effect of the irrigation during the season on average weed cover was the opposite of what was expected. The irrigated plots had a higher percent broadleaf weed cover than the non-irrigated plots. It is possible that the irrigation provided the necessary moisture for weed seed germination during a droughty year.

#### Pesticide Reduction

At the GTI, conventional plots received a total of six broadcast pesticide applications, while the IPM plots received only two treatments and many of these plots were spot treatments only. The alternative plots received a total of five broadcast treatments of organic herbicides. At Brantford there was an additional post emergence crabgrass treatment on the IPM plots due to the presence of crabgrass on some plots. This represents a reduction of 66.6% in the number of pesticide applications at GTI for each year of the study and a reduction of 50% in the number of pesticide applications at Brantford for each year of the study.

The total area that was treated with pesticides each year on the IPM plots vs. the conventional plots was also calculated for GTI and Brantford in Table1. By year three of the study there was a 99.35% reduction in the amount of area treated with pesticides for GTI and a 98.33% reduction in the area treated at Brantford. A part of this reduction was due to the fact that the conventional plots received two insecticide treatments and a pre-emergence crabgrass treatment and the IPM plots demonstrated that those three treatments were not necessary. Secondly, by year three there was

**Table 1. Total reduction of pesticide treated area of IPM vs. conventional plots in Brantford and GTI in all years.**

| Location | Treatment | 2003 | 2004 | 2005 |
|---|---|---|---|---|
| GTI | Conventional | 2376 | 2376 | 2376 |
| GTI | IPM | 350.955 | 165.924 | 15.444 |
| GTI % Reduction (Conventional–IPM/Conventional x 100) | | **85.23%** | **93.01%** | **99.35%** |
| Brantford | Conventional | 1680 | 1680 | 1680 |
| Brantford | IPM | 221.2 | 31.08 | 28 |
| GTI % Reduction (Conventional–IPM/Conventional x 100) | | **86.80%** | **98.15%** | **98.33%** |

only a need to spot treat for broadleaf weeds and this also greatly reduced the amount of area treated with pesticide in the IPM plots.

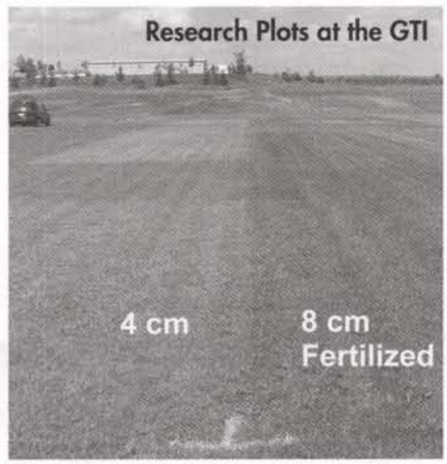
### Conclusions

Turf quality was highest in conventional followed by IPM, alternative and no-pesticide programs in all three years. Despite the 50-66.67% reduction in the number of pesticide use or the 98-99% reduction in the area of turf treated with pesticides in the IPM plots compared to conventional plots, the quality of the turf in IPM plots was only reduced slightly. In addition, quality of the turf at the two different mowing heights was very similar. The 4 cm height of cut was slightly denser than the 8 cm height of cut. The application of fertilizer improved turf colour and density resulting in higher quality ratings and it also reduced broadleaf weed cover in the no-pesticide plots.

Turfgrass insects were not an issue in all three municipalities in all three years. They were all present in numbers below the OMAFRA threshold for each pest. Crabgrass infestation was also not a problem. It was only found at Brantford and London in numbers below the IPM threshold level (10-15%) with the exception of one plot in 2003. In subsequent years, it was below the threshold and only required spot treatment in a few plots. Again, this study demonstrated very significant pesticide reductions without loss of turf quality by implementing IPM.

As for broadleaf weed cover, a couple of trends were observed. The no pesticide/no fertilizer plots at GTI had a rapid increase in broadleaf weeds in 2003, up to 60%. This remained steady through 2004 until the late fall. Weed cover rose again in the summer of 2005, but it did not go as high 2003. Finally, at the end of the summer in 2005, the weed population declined to 30%. Both the no pesticide/fertilized plots and the alternative plots had an increase in weeds in the summer of 2003. The following seasons there was a steady decline in weeds to a final weed count of 10% at the end of the study period. This trend was very similar in the no pesticide plots at Brantford and London. There was a noticeable interaction between the different growing seasons and the broadleaf weeds, with all weed populations decreasing in 2005. This was consistent at all three sites and demonstrates the effect of temperature and rainfall on weed ecology. This trial clearly demonstrated that broadleaf weed cover can be greatly reduced with regular applications of fertilizer at a rate of 2.0 kg of nitrogen/100m$^2$ per season. With this rate of fertilizer application, weeds were below the OMAFRA threshold of 10-15% and only spot treatment would be needed, eliminating the need for broadcast applications of broadleaf herbicides. ♦

*— Gema Cheong, Ontario Pesticide Advisory Committee (OPAC) Resource Technician (RT); Stacey Fearman, OPAC RT; Erica Gunn, Guelph Turfgrass Institute RT; and Pam Charbonneau, OMAFRA*

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