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Sports Turf Manager

FOR BETTER, SAFER SPORTS TURF. WINTER 2013.

“Winter is on my head, but eternal spring is in my heart.” ~ Victor Hugo

Inside this issue...

REGULAR COLUMNS, DEPARTMENTS & SMALL FEATURES

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

Deadline for Spring 2014 Sports Turf Manager: March 7

SPORTS TURF ASSOCIATION

WHAT’S ONLINE

www.sportsturfassociation.com

Your email address must be registered with us to log-in to the Members Only Section

Login to the Members Only Section

- Registration Form for STA members for the Sports Turf Managers Association Annual Conference & Exhibition in January
- 2014 Board of Directors Slate of Nominees and information for the STA Annual General Meeting as it becomes available

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STA OFFICE HOURS
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President's Desk

BY PAUL GILLEN

Welcome to the Winter edition of your association's newsletter. Your executive has been very active during the late summer and early fall and there will be some exiting new announcements coming later this year and into the spring. Watch your emails for updates and visit the website often during the winter months.

STA, together with the Ontario Recreation Facilities Association, presented in November an Introduction to Synthetic Turf and Air-Supported Structures workshop at the Guelph Turfgrass Institute and University of Guelph. Thank you to our speakers Mark Nicholls, Turf Industry/UBU Sports, Gord Dol, Dol Turf Restoration/Sports Turf International, and Ian McCormick, The Farley Group. After the morning indoor sessions we bussed over to the University of Guelph campus where Bill Clausen, Frank Cain and Andrew Godard took us on a tour of the synthetic turf fields, Fieldhouse and Alumni Stadium. Thanks gentlemen! And thank you to all who joined us on the sunny but very cold excursion! If you were unable to attend this event, Ian McCormick has provided us with an article inside offering you an introduction to air-supported structures. There will also be sessions on synthetic turf in the programs of all three of the upcoming conferences for sports turf managers. See the Event Calendar for dates and details for the Sports Turf Managers Association Conference & Exhibition, the Ontario Turfgrass Symposium, and the Canadian International Turfgrass Conference & Trade Show. We hope to see you at one of them!

Speaking of sports fields and the cold, when you receive this issue the Grey Cup will have been decided... Hamilton versus Saskatchewan – should be a great game in a frigid Regina venue! Read in this issue how the Hamilton Tiger-Cats came to play their 2013 season "home away from home" games in Guelph, just up the road from their actual home in Hamilton, Ontario.

That's it for me!

Our very best wishes for a safe holiday season and happy New Year. •

On the field session at Alumni Stadium, University of Guelph.

Event Calendar

December 15
Early Bird Registration Deadline
Sports Turf Managers Association
Conference & Exhibition
San Antonio, Texas
www.stma.org
STA members can register at STMA rates!

2014

January 7 to 9
Landscape Ontario Congress
Toronto, Ontario
www.locongress.com

January 10
Early Bird Registration Deadline
Ontario Turfgrass Symposium
The Changing Face of Turf
University of Guelph
Guelph, ON
www.turfsymposium.ca

January 21 to 24
Sports Turf Managers Association
Conference & Exhibition
San Antonio, Texas
www.stma.org
STA members can register at STMA rates!

January 27 to February 21
University of Guelph
Turf Managers' Short Course
Guelph, ON
www.turfmanagers.ca

February 17 to 21
Western Canada Turfgrass Association/
Canadian Golf Superintendents Association
Canadian International Turfgrass Conference & Trade Show
Vancouver, BC
www.wcta-online.com

February 19 and 20
Ontario Turfgrass Symposium
The Changing Face of Turf
University of Guelph
Guelph, ON
www.turfsymposium.ca

April 28 to May 1
Sports Turf Association
Sports Turf Management & Maintenance Course
University of Guelph
Guelph, ON
www.sportsturfassociation.com/STMM Course

May 1
Sports Turf Association
Robert W. Sheard Scholarship Deadline
www.sportsturfassociation.com/Awards & Scholarship

Optimizing Your Fertilizer Applications *Continued from page 1*

Figure 1. Spreader alignment for pan test (photo courtesy of Ferti Technologies)

Figure 2. Evenly spaced pans to either side of path of travel (photo courtesy of Ferti Technologies)

the scarcest resource." This means that all of the 14 essential nutrients required for plant growth must be present in at least the minimal amount. Although some soils exist with natural imbalances that are nearly impossible to overcome solely through fertilizer and amendment applications (e.g. high calcium levels of southern Ontario), most issues can be dealt with once they are detected. Several methods exist to determine the nutritional state of the soil medium in which turf is grown including soil testing, plant tissue testing and simply looking at the plants for symptoms of deficiency or excess.

Soil testing can provide a good, basic picture of the soil chemistry and changes made over time by a nutrient management plan. While there is very limited research-based data on the exact nutritional needs of turfgrass, there exists a wealth of knowledge, based on years of management of turf in soils. This knowledge allows for fairly accurate fertility programs to be written based on soil analysis, combined with turf type and use requirements. Plant tissue testing provides confirmation of the ability of turf to take in and utilize the applied nutrients, and can also be used for pinpointing more specific issues not easily determined through soil testing. Looking at turfgrass stands for common symptoms of deficiencies such as discolouration of leaf blades and abnormal growth, can also provide clues that an adjustment in soil nutrient levels is necessary. These symptoms may also suggest that certain nutrients are not being taken up due to some existing conditions such as water-logging or cold soil temperatures.

Rate. The rate at which a fertilizer is applied is a very important factor in the efficiency of a fertilizer or amendment application. This will be expanded upon more in the discussion of calibration, further along in this article.

Slow Release Technologies. While the turfgrass industry is quite large, it still is only a small portion of the agriculture/horticulture industry as whole. As such, most of the products we enjoy using in turfgrass management were developed for use in agricultural and/or greenhouse production. We enjoy fruits of the labour spent developing fertilizer and pesticide products for those industries, along with a preview of how they can be best utilized for turfgrass. Among these are slow release nutrient technologies.

Most slow release research deals with the nutrient required in the greatest quantity by the plant: nitrogen. This is partly due to the issues surrounding the instability of nitrogen in the soil. Most nitrogen sources are urea-based as it is the most economical source, due to the relatively low cost of production combined with the high-percentage of nitrogen it provides at 46%. Straight urea, is unfortunately easily converted in the soil to forms that are lost to the environment through leaching and volatilizing as well as being tied up by certain soil microorganisms. Urea is frequently coated, reacted or made less prone to these changes through the addition of inhibitors to microbial degradation.

Additionally, many other nutrients are made slowly available for the purpose of reducing losses and improving plant uptake. Every slow release source has a specific mechanism of release. Many reacted and organic sources require time and soil conditions conducive to microbial breakdown. Some more advanced physical coatings require combinations of soil temperature and the presence of water to allow release in tune with the needs of the turf throughout the growing season.

When these sources are applied with expectations to feed during a time when soil conditions are not ideal for release, there is a large loss of efficiency.

Application. All of the resources spent developing the many products that we have available and creating programs best suited to the specific needs of the sites we manage is wasted if the final step, application, is performed incorrectly. There are many stages in the application process where efficiency can be less-than-ideal, leading to significant losses in efficacy of our products. The next part of this article involves reducing these losses through good planning and education.

Fine Tuning Your Turf Management Program

A fertilizer or amendment product is only as good as the application.

While every aspect of a procedure is subject to improvement over time based on experience and new information, there are a few points relative to fertilizer applications that are often overlooked and can yield great returns if identified and addressed. These are: planning, proper application preparation and equipment calibration.

When I give a talk on calibration I often ask people in the audience: "When do you calibrate your spreaders?" Many times the reply is that it is done just before the application, if at all. A calibration performed under the pressure of time to get out ahead of play or field use is subject to error.

It is common for turf operations to have fertilizers in stock well in advance of application as well as spreaders and the operators to use them. Periods of time when the crew cannot be on the turf due to play, an event or even rainy weather, are built-in opportunities throughout the season for calibration. Most facilities have an equipment storage area that is well suited to use for a calibration of walking spreaders and even some driven ones, which makes this process fairly simple and efficient. By following the steps below, the cost of getting into a routine of calibration in advance and utilizing "down time" will be more than justified in product savings and results.

Many fertilizer and amendment products from companies that supply the turf industry, are formulated using years of experience, customer feedback and testing, to ensure the best results. All of the science and experience in creating products cannot offset the detrimental effect of misapplication. Quite simply, if a product is applied at an improper rate, at the wrong time or with a piece of equipment that has not been properly calibrated, it will not perform as expected.

Calibration: Point-by-Point

Calibration simply defined is "to adjust a feature for accuracy". We calibrate to ensure that the amount of product applied will do the job intended. If too much is applied, you could see negative effects such as excessive growth, increased susceptibility to pests, losses of nutrients into the environment and possibly turf loss. Applications at less than the desired rate will result in poor performance, less tolerance to stressors and a shorter interval before the next application is required.

The equipment used for granular and liquid applications is calibrated in similar ways, but has one distinct difference when it comes to every day applications; granular spreaders should be calibrated for every material as each product will spread differently based on particle sizing, particle shape(s), density and uniformity index. Additionally, every spreader applying a material should be calibrated as age, condition and set-up will vary from unit to unit.

There are three basic pieces of information necessary to calibrate application equipment: application rate, width and speed. Each is discussed individually below.

Rate. The application rate needed to calibrate a granular spreader is based on how much of the product needs to be applied to achieve the prescribed amount of nutrient, or active ingredient in the case of granular pesticide, to a given area. Most times, this information is provided in the technical literature that accompanies the product, or can be derived with some simple math.

The fluid application rate for a sprayer is based on the target area of the spray solution: the leaf blade, crown area or in the soil. These rates will vary from around 6 litres/100 m^2 (1.5 U.G. Gallons/1,000 ft^2) to possibly more than 20 litres/100 m^2 (5 U.G. Gallons/1,000 ft^2). More often than not, managers will calibrate their sprayers with multiple nozzles or at differing speeds/pressures to allow for a range of liquid application rates. Once the sprayer is properly calibrated and double-checked, it is simply a matter of making sure that the volume/weight of product added to the tank matches the amount of area to be sprayed.

Width. The distance from the spreader at which the amount of applied product is approximately one-half of what is applied directly in the path of the spreader is called the effective width. Spread patterns can be different, as there are several types of spreaders including broadcast (with single and double impellers) and pendulum-action, such as Vicons. Some have a triangular shape where the applied amount is gradually reduced as the distance from the spreader increases. Others have a flat pattern where the applied amount remains consistent to a certain point, and then drops off suddenly.

The most common method of determining the effective width of a material applied with a granular spreader is called a pan test and involves placing a series of shallow pans perpendicular to the spreader's path of travel to catch material. The pans can be something as simple as aluminum baking pans lined with cloth or paper, which prevents granular material from bouncing out (Figures 1 & 2). There will be an odd number of pans, with one in the centre and the rest at equal distances out from the centre on each side with one just shy of and one just beyond the estimated width of throw. It is necessary to spread over the pans in the same direction several times to collect enough material to determine the effective width. Always traveling the same direction will also help detect biases in the pattern that can be corrected by adjusting hopper openings or other components of the spreader. The width necessary to calibrate sprayers is the distance between nozzles as there is a simple formula that will provide a distance over which the sprayer should be timed for use later in the procedure.

Speed. The type of spreader being used determines the operating speed. Walking spreaders should be calibrated for each operator as ground speed directly affects effective width. Operators should calibrate at a speed that they can maintain throughout the entire spreading job. If an operator were to calibrate at a fast pace, and then slow down during some point of the spreading job, the applied rate would increase due to a decrease in effective width. To keep this organized, each operator would be assigned a spreader if there are to be multiple applicators for the same product. Differentiating like spreaders with a number or letter will

Figure 3. An example of a gate calibration device (photo: Sean Jordan)

Figure 4. A common calibration catch used for pedestrian broadcast spreaders (photo courtesy of White Castle)

reduce variables at the time of application.

The speed for a vehicle or tractor-mounted spreader should be safe yet productive. When determining a safe speed, the area of turf that poses the greatest danger due to slope or proximity of hazards should be the greatest limiting factor. Also, many times a tractor will be limited in choices of speed due to the fact that a certain engine speed must be maintained for PTO-driven spreaders and sprayers.

Once these three pieces of information are collected or determined, the process becomes one of trial and error to determine the correct spreader setting for each material (and operator, in the case of walking spreaders). Spreader settings that are given on the bag or in the technical literature are provided as starting points for calibration. It is not possible to provide universal settings that will be right for every spreader and every operator as the variations mentioned earlier will cause differences in applied rates between spreaders.

Additionally, there are tools that are specifically developed to aid in calibrating granular spreaders. These include guides to measure the opening of hopper gates at specific settings and devices that catch material as the spreader runs to reduce the mess usually associated with calibrating spreaders (Figures 3 & 4).

Regular cleaning and adjustment is crucial to maintaining application equipment that performs consistently. Follow manufacturers' guidelines found in each piece of equipment's owner's manuals for set up and maintenance. Included in this is information on gate settings, tire pressure and lubrication points, all of which should be checked before each application. As well the spreader should be thoroughly cleaned and dried after each use.

Putting It All Together

Taking the time to formulate a solid fertilizer and amendment program created with good science and experience will pay off. A plan built on a foundation of quality products that are used at the right rate and applied through properly calibrated application equipment will provide the best possible results. As much as the time and effort to develop a good plan may sound like it will cost more, the savings in labour and improved turf stands will more than pay for the plan. •

Impact of Turfgrass Fertilization on Nutrient Losses Through Runoff and Leaching

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Figure 2. Slit ABS pipe placed at the lowest part of the plots to collect runoff water.

Figure 1. Excavated plot with the two plastic sheets and the drain used to collect leachate.

Figure 3. Tipping bucket used to measure water volume from leaching and runoff and plastic container used to collect water sample.

Introduction

Over the last few years, there have been increasing concerns from the population about the effects of turfgrass fertilization on nutrient losses to nearby water bodies. Several cities have even adopted by-laws to restrict, or even ban the use of fertilizers on turfgrass. However, those by-laws are generally not based on science, and their effect to reduce nutrient load to water bodies has not been demonstrated. Furthermore, it has been shown that unfertilized turfgrass can result in higher nutrient losses compared to properly fertilized turf. Indeed, healthy fertilized turfgrass is denser and more efficient to reduce runoff and erosion than unfertilized turfgrass[1–3]. In 2011, we started a research project to quantify nutrient losses through runoff and leaching from two conventional fertilization programs based on industry practices and one program based on a typical by-law. We also included unfertilized treatments as controls.

Methodology

This project was established at our research facility located on Université Laval campus in Québec city. With the help of an excavation company, we built 15 hydrologically isolated plots during the summer of 2011. These plots are 5 m wide by 10 m long, and have a v-shaped bottom with a depth of 50 cm in the middle and 30 cm on the sides. Two sheets of plastic were placed at the bottom of each plot in order to isolate them from the water table, and a perforated drain was placed in on top of these plastic covers (Figure 1). Plots were then filled with the excavated soil and graded with a laser in order to obtain a 5% slope at the surface. Kentucky bluegrass was then sodded on the plots that will be used for the three fertilized treatments. In order to accelerate the effects of not fertilizing turfgrass for the control plots, we harvested turf that was not fertilized for five years from a nearby area, and used that to cover the control plots. In addition to grasses (30% Kentucky bluegrass, 15% sheep fescue, 15% colonial bentgrass) this cover contained about 20% clover and 20% of other broadleaf weeds (dandelion, plantain, orange hawkweed, etc.).

In each plot, we installed three capacitance soil moisture probes (at depths of 10, 20 and 30 cm) and one temperature sensor (at a depth of 10 cm) that automatically took readings every hour. In order to collect runoff water, we placed a 4" ABS pipe with a slit at surface of the soil in the lowest part of the plot (Figure 2). The result is that each plot has two water collection pipes: one for leachate (through the perforated drain) and one for runoff (from the PVC pipe). In order to measure water volumes from these two sources, we placed a tipping bucket hooked to a data logger under each pipe (Figure 3). Once the bucket is filled with 500 mL of water, it tips and the data logger registers this tipping event. By multiplying the number of tips recorded by the data logger by 500 mL, we can determine the total volume of water exiting the plot through runoff and leaching. Since we also collect a water sample from each tip and analyze it for nutrient content

(N and P), we can determine the total nutrient load in the water coming off the plots.

We started applying the treatments in the spring of 2012. Five treatments were evaluated as a completely randomized design with three replicates. The three fertilized treatments were based on industry practices (treatment 1 and 2) and on a typical city by-law currently in place in Québec (treatment 3). We also have two unfertilized treatments, one with some maintenance practices applied (aerification, topdress, overseed) and the other one unmaintained. Specifically, the evaluated treatments are:

1. Synthetic fertilizer: 20-0-12 with 50% slow-release N (1.5 kg N/100 m^2/yr) split in four applications (May, June, August, September).
2. Natural fertilizer: 9-2-5 (1.5 kg N/100 m^2/yr) split in four applications (May, June, August, September).
3. Compost: 1.8-1-0.9 (1.5 kg N/100 m^2/yr) applied all at once in May
4. Unfertilized maintained
5. Unfertilized control

The plots were irrigated in order to prevent turf dormancy. We calibrated the irrigation system to make sure each plot received the same amount of water during the irrigation events. We also evaluated turfgrass visual quality monthly on a 1 to 9 scale (1 = low quality, 9 = high quality, 6 = acceptable quality).

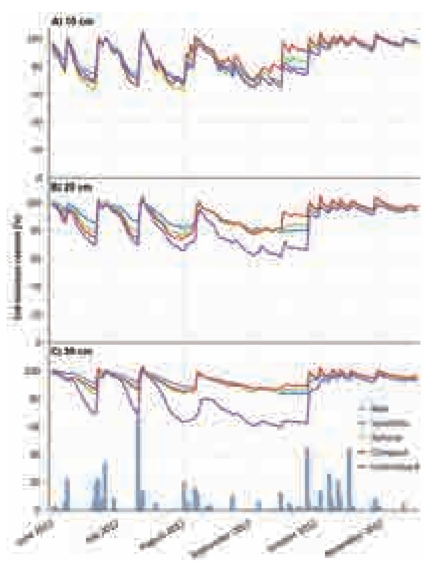

Figure 4. Soil water content at three depths (10, 20 and 30 cm) in the research plots throughout the 2012 growing season.

Results

The results presented here are only from the first year of experiment, and this project is planned to run for at least another year. Thus, they should be considered preliminary. Since we did not apply any maintenance (aerification, topdress, overseed) in 2012, both unfertilized treatments were merged together for the result analysis.

Soil water content. The summer of 2012 was exceptionally dry in Québec city, as shown on the precipitation and soil moisture readings chart (Figure 4). We did observe significant differences in soil moisture content, especially at depths of 20 and 30 cm. The fertilized plots (regardless of the treatment) had a consistently higher soil water content compared to the unfertilized plots. Dry root mass was also significantly smaller in the unfertilized plots (data not shown). Some of these differences are likely due to the type of cover (i.e. Kentucky bluegrass sod, vs mixed species cover), but we do not know yet the exact explanation for these observations.

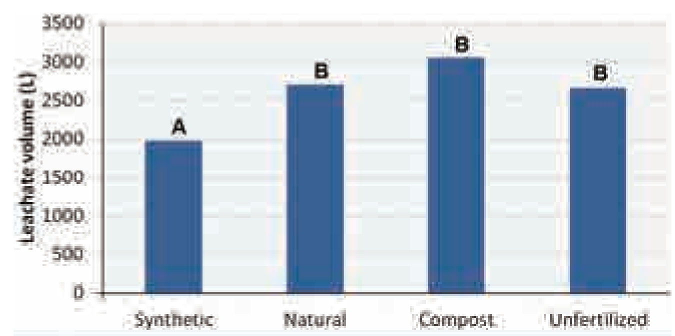

Figure 5. Total leachate volumes as affected by the different treatments during the 2012 season. Columns with the same letter are not statistically different.

Leaching. When we look at the total volume of water leached through the plots, as measured with the tipping buckets, we can see that plots fertilized with the synthetic fertilizer have a significantly lower leaching volume than the other plots (Figure 5). Since all plots received the same amounts of water, and that soil water content was similar for all fertilized plots, this difference could be caused by an increased evapotranspiration rate in these plots. Since this treatment is the one that supplied the most readily available N (50% of quick release N), it probably resulted in an increased growth rate, with plants actively using water.

We observed significant differences between the treatments in nitrate (NO_3-) and ammonium (NH_4+) content in the leachate (Figure 6). There was more nitrate losses through leaching from the fertilized plots than from the unfertilized plots. However, there was more ammonium lost in leachate from unfertilized plots compared to fertilized plots. It is interesting to note that there were no significant differences in nitrogen losses between the different fertilizer sources.

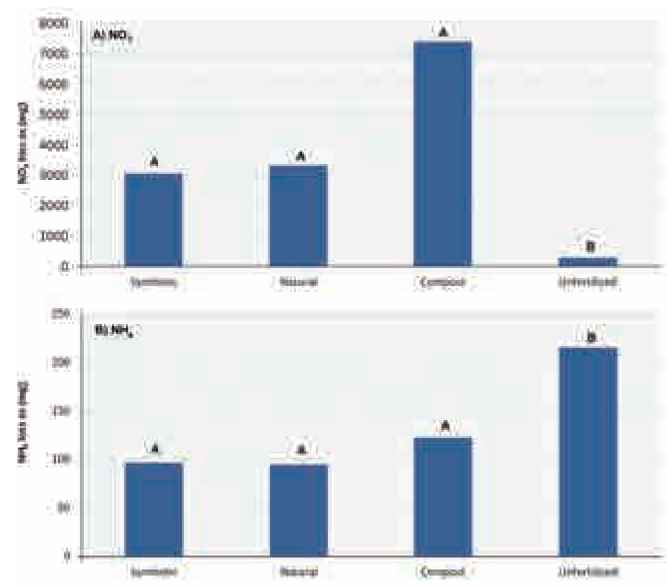

Figure 6. Total nitrogen losses from the experimental plots during the 2012 growing season in A) nitrate and B) ammonium. Columns with the same letter are not statistically different.