## Fertilizer Technology: Understanding Slow Release Nitrogen

Dr. Eric Lyons, Associate Professor, Department of Plant Agriculture, University of Guelph

#### WATER-BASED RELEASE

#### Sulfer Coated Urea (SCU)

SCU is a prill of urea that is coated with sulfur. The sulfur protects the urea from immediately dissolving when it comes in contact with water. The sulfur must first dissolve before the water can dissolve the urea inside. The release of SCU is often referred to as catastrophic release because once the integrity of the coating is compromised, the urea immediately becomes readily available.



**Above.** Over-application of sulfur coated urea (SCU) fertilizer that resulted in burn. Although the fertilizer contained SCU a significant portion of the nitrogen in the bag was straight urea.

Sulfur coated urea releases primarily as a function of available water; the more water present, the faster the sulfur will be dissolved allowing its release. Temperature is also a factor as things dissolve slower at colder temperatures, but water remains the most important environmental factor affecting the release. Manufacturing and handling of the product also affects its release, as do other factors such as thickness and uniformity of the coating. Thicker coatings will release more slowly. In addition, the integrity of the prill is essential. During shipping and handling, any cracks will render the coating worthless and all of the urea readily available. Mowers can also cause damage to the prill resulting in faster release. Sulfur coated urea costs more than straight urea per unit nitrogen and ranges in price greatly depend on quality and trucking fees. As far as slow release technologies are concerned however, it is one of the least expensive.

#### Isobutylidene-diurea (IBDU)

IBDU is urea that is reacted with carbon to form a short carbon chain attached to the urea molecule. This molecule breaks down slowly in the presence of water releasing the nitrogen in the form of urea. The release is primarily water dependent although it does slow a little at lower temperatures. The best analogy for its release is that like a bar of soap, it slowly rubs off over time. The water slowly releases the urea through hydrolysis (the splitting with water). This release mechanism means that the smaller the prill or particle, the faster the release. In this case you may get four weeks of release from a small prill and larger prills can get up to 6-8 weeks of release. Straight IBDU has an analysis of 31-0-0 and IBDU is 85-90% slowly available nitrogen, the rest being urea.

#### **TEMPERATURE-BASED RELEASE**

#### **Polymer Coated Urea (PCU)**

PCU is a prill of urea that is coated in polymers (plastic). These polymers create a barrier that slows the water from reaching the urea inside the prill and the dissolved urea from escaping. Unlike SCU, the coating remains intact and the release is dependent on the diffusion of the urea through microscopic fissures (channels) in the coating. This release mechanism makes the release very dependent on temperature because with warmer temperatures diffusion occurs at a faster rate. Water must be present but the amount of water is not as important as temperature. One drawback of this technology is that the prill, while it may eventually break down in the soil, remains after the urea has dissolved. Large amounts of nitrogen can be applied at once but if the operator overlaps improperly, it can result in an entire season of having excessive nitrogen striped down the field. In addition, timing of applications may need

to be changed based on the temperature of the season. A cold spring may require a delay in the early summer application while a warm spring may require an earlier application than originally planned.

#### **Methylene Urea**

Methylene urea is urea that is reacted with carbon to form intermediate and long carbon chains. Microbes degrade the carbon chains to release the nitrogen. The length of the carbon chain determines the length of time it takes to release the urea. Different methylene urea products can have the same amount of slow release nitrogen but their release times will vary based on the length of the carbon chains. Release characteristics of methylene urea can vary greatly from product to product. The reason temperature mediates release is because microbial activity is regulated by temperature.

#### Formaldehyde Urea

This is similar to methylene urea but the chains are even longer and they can last much longer in the soil. Microbial activity affects the release, therefore temperature is the most important factor in determining the release characteristics. With both methylene and formaldehyde urea it is important to note that smaller prill sizes will break down quicker due to more surface area available for microbial action but it is less important than with the IB ureas.

#### Summary

Proper nitrogen fertility is important to maintain sufficient growth throughout the playing season without creating excessive growth. Understanding the benefits and limitations of fertilizer technologies will help maximize resources within a sports field management operation. In the end, the technology is only as good as the people who implement the programs.

FIELD DAY HIGHLIGHT Continued from cover...



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## The Many Challenges of Sports Turf Management in a School Board Environment

### R. Guy Mackie, 2011 STA Scholarship Recipient

In this article, I will cover some of the challenges associated with managing sports turf within the school board setting – and I'll sincerely strive to do so without it sounding like a gripe fest – though this may be a challenge. For the purpose of perspective, I should mention that my experience with the board spans a mere seven years. I have, however, worked in the landscape industry for the past 25 years in a number of different disciplines. The list below covers common issues we deal with. It's a long list to be sure, and I don't anticipate the adoption of all, or frankly any, of the proposed solutions should they make it to the ears of those with the powers to affect change. However, we've got to talk about these issues. Our passion dictates that we do.



**Reciprocal Agreements** 

The need for reciprocal agreements seems like a "no brainer" to me, however, I'll admit up front that I have limited experience with them. Here's how I see it. The school board has a resource, athletic fields. Municipalities have a somewhat fluctuating need for these fields and the school board has a certain obligation to share these resources. Municipalities seem to have, by observation, much larger budgets (as evidenced by the amount of manpower, equipment and materials available). I also assume that athletic programs operated on school board properties would generate revenues for the cities. We, at the board, do what we can within our budgets to maintain safe, playable surfaces but are falling short, way short in my humble opinion. But if we supply the fields and help with the maintenance, and the municipality also contributes to maintenance while generating revenues to offset their increased costs, and the results are safer, better quality turf for both, I'd call that mutually beneficial. I'd also call it a joint effort with shared and complimentary resources to achieve a common goal, thus a "no brainer."

## THE ISSUES...

- Reciprocal agreements. Is there a mutual need?
- Low bid policy. Is it what the taxpayer really wants?
- Budgets. Is there any flexibility?
- User cooperation. Aren't we in this together?
- The value of professionals. If you're going to pay, pay for passion and education as staying current pays dividends.
- Water conservation. Is legislation next?
- Contracting out. Is it cheaper?
- The Cosmetic Pesticides Ban. How do we best implement?



#### The Lowest Bid Wins (Or Does It?)

Does the typical low bid policy, whether adopted by or imposed upon the board by government, have to be so structured and inflexible? Does the taxpayer always want the lowest price possible or would they prefer good value for their dollar? And who are these low bidders? Sometimes they're large companies or franchises doing large volumes to cover large overheads. Sometimes they're smaller companies trying to make their mark. Some companies in both categories are desperate for work, work they need to keep employees and suppliers on board. They are not concerned initially with profit, until they hit the job site. The results typically are substandard or unspecified materials and substandard practices that result in grading, drainage, seeding and compaction issues. Further, maintenance obligations and warranty issues are

neglected. A lack of supervision and required inspections by the board only serve as contributing factors to these results. We have had the lowest bidder provide quality workmanship and products on many occasions, so we know it's achievable. We just need some flexibility within the policy to achieve these results more frequently and realize value for taxpayer dollars.

#### **Budget Flexibility**

When we hear the word budget, we often think set in stone, cast, or poured in place. We do this, I believe, to our detriment. Budgets should have inherent flexibility. For example, combining this year's budget with next year's to enable us to acquire an irrigation system that provides optimum, efficient coverage with better materials that increase the life span of both field and system makes sense to me. But "carry-over" rules would need to be changed or more aptly manipulated for long-term advantage. Perhaps we could take a percentage of dollars designated for low use turf areas and combine them with dollars allocated for high use athletic turf. This would make it just that much more safer and playable, concentrating dollars for effect or prioritizing for more effective use of budgets. We all know budgets need parameters, but creativity within budgets may produce surprising results.

#### **User-Manager Relationship**

Another challenge we face as turf managers is our relationship with the users of our facilities. You would think this would be a match made in heaven. We want to provide safe, quality turfgrass and they want to play on safe, quality turfgrass. Is there an echo in here? But, unfortunately that's where the similarities end. The keys here are respect and cooperation. If the school administration and athletic departments as well as municipal groups respected us as turf management professionals they wouldn't, as requested, use fields before the spring minimum deadline, use the fields when wet or raining, and reduce wear by using end zones and auxiliary fields for practice purposes and physical education classes. The message we try to convey is basic: limited maintenance funds are no match for unnecessary misuse. It just doesn't work. It's perplexing to me. We have the same ultimate goal, but I believe different attitudes.

#### **Professionalism & Professionals**

School boards could benefit from more of each of these. Turfgrass management is not a fledgling industry and school boards should be actively recruiting educated and experienced individuals. Turf professionals dedicate time to education and work hard in their trade to gain experience. This invariably leads to people who are passionate about their work. When you work with like-minded individuals, problem solving seems easier, there is more collaboration and ideas flow freely. It bears repeating; if you have to pay, pay for passion.

Time for a brief testimonial. Here are just a few lines to sing the praises of continuing education. My career started with a three-year landscape technology course, a pretty solid industry beginning. I have taken courses and attended seminars throughout my career and since landing at the school board, have obtained my Certified Irrigation Technician designation and completed the Turf Managers' Short Course. I have other courses in mind as well. I find the more I learn, the more I want to learn. All this upgrading has proved invaluable. I deal with contractors, architects, municipal officials, partners and other professionals with confidence. The courses and professional development have an almost direct affect on my ability to do my job better. Sign me up for more!

#### Water Conservation

I need to talk about the challenges of water use as they relate to our irrigation systems. We have 16 high schools in our board with at least one and often two systems at each. All of this was achieved in a relatively short time period, but I wish the list goes on. Due in part to the aforementioned low bid policy and perhaps specifications lacking, the results are inadequate pressure, poor head installation, spacing and selection. All these result in a grossly inefficient application of water, the exact opposite of what irrigation systems are supposed to achieve. I've heard it said that some irrigation is better than none at all. But, in this era of water conservation, when efficient use of this resource may very well be legislated upon us in the near future, don't we need the most efficient and effective application possible? To this end, we need to start with a quality system, one that is well installed, and make the time to monitor and maintain.

#### Sub-Contracting

Another contentious issue of late is that of contracting out. The initial motivation seems to be to save money. Can I put an operator on a mower for less than the average

You would think the user-manager relationship would be a match made in heaven. We want to provide safe, quality turfgrass and they want to play on safe, quality turfgrass. Is there an echo in here? Unfortunately, this is where the similarities end.



it hadn't been. Systems were installed so quickly we rarely had time to evaluate their effectiveness and subsequently determine if changes, upgrades or downgrades should be made. We now have many systems installed without consideration for design and design patterns, available water, static pressure requirements, head spacing and selection, drainage, vandalism issues and maintenance contractor? I personally don't know and am not in a position to find out. However, I am a proponent of efficiencies and as a former contractor, I know I had to use my equipment almost year round to fund the next new piece. Perhaps it's more related to priorities. We could focus our resources on what we do best, most efficiently and more cost effectively, and let others do the same. Work contracted out can't be forgotten however. Contractors have to be managed. They're not all professionals like you and me. Some are desperate for work, they take on too much and quality suffers. A good rule of thumb may be to go with your strengths and evaluate often.

#### **Cosmetic Pesticides Ban**

We haven't used pesticides at our school board for over ten years, and this strategy was self-imposed. Naturally, we utilize more cultural practices, but the effects are minimal. I am certainly not a proponent of indiscriminate pesticide use. However, I believe the restricted use on specific, high use areas by professionals would result in safer, more playable turf where it is needed most. It's concentrating effort and resources for areas of concentrated use. It's a fair and logical compromise.

#### The Last Word

In my attempt to relate the challenges associated with sports turf management in a school board setting, it is my sincere hope that I didn't come across as too critical. The challenges are unique and I readily admit, somewhat new to me. I offered solutions based on experience that some might deem inadequate. But, I can assure you that my common sense is intact and I use it frequently to keep it sharp! I believe reciprocal agreements are necessary, but not imperative. A rigid low bid policy is detrimental to quality and budgets without flexibility are limiting. User groups need to be more respective and cooperative and trust the judgement of the turf professional. And speaking of professionals, isn't it time we gave these dedicated individuals the opportunity to ply their trade, yes I said trade, in private as well as public organizations.

Finally, I can't stress enough the benefits of educational opportunities for staying current in the turfgrass industry. Knowledge breeds confidence and confident people take chances. They experiment and break through barriers. In this ecofriendly era, the double challenge of efficient water use and pesticide restrictions put the turfgrass industry on its heels, but only briefly. The response was swift, with new irrigation technologies and techniques and groundbreaking research in pesticide alternatives.

It's a great time to be a turfgrass manager and I'm proud to count myself among the many. The dedication I witnessed in my fellow students at the 2011 Turf Managers' Short Course bodes well for the industry. As for the challenges I face at the school board, I feel prepared.

#### QUOTABLE QUOTE

High school sports: where lessons of life are still being learned, and where athletes still compete for the love of the game and their teammates. ~ Michael Powers

## **Industry News** Posa educational opportunities & supporting rural areas

## **POSA Summer Operational Forum a Success**

**THE 5<sup>TH</sup> ANNUAL PARKS AND OPEN SPACE ALLIANCE** (POSA) Summer Operational Forum was presented June 22 at the St. Catharines Museum and Welland Canals Centre. The theme was "The New Face of Parks and Open Spaces."

The keynote speaker was Debbie Whitehouse, Senior Director Guest Relations – Gardens & Nature, The Niagara Parks Commission (NPC). I was pleased to be the chair of the day and welcome and introduce Debbie who I have known for many years.



Debbie Whitehouse & Jay Kivell, POSA Summer Forum.

Paul Ronan, Executive Director of OPA, Vic Hergott, parks sector professional and Rolf Huber of Everplay Installation all spoke about the Good, the Bad and the Ugly. Two issues addressed were the impact of the AODA Legislation and the popularity of outdoor gym equipment being installed in parks. The AODA Legislation can easily be dealt with by referring to the CSA Standards for Play Equipment that has a section on the AODA. As for the gym equipment, standards are required and industry experts

are working together with the CSA to

establish them. As well, more users, less budget dollars and the challenge of finding trained staff is difficult. Not much has changed over the past 40 years.

Ministry of Labour and Frank Cowan Company representatives spoke on the risks, responsibilities and benefits of using volunteers. Volunteers need to be given an orientation to the job and worksite, be given adequate and job specific training for the job that they are doing and be given an adequate performance appraisal. There is a fine balance between an acceptable volunteer and a diligent operation. We were challenged to find that balance.

Throughout the morning and during lunch we had an opportunity to visit the exhibitors and find out about their products and services. After lunch we had an opportunity to discuss open forum topics of interest including dog off leash parks, splash pads and wading pools, and outdoor ice rinks.

The next educational opportunity presented by the coalition is the Introduction to Synthetic Turf and Maintenance workshop, November 10, at Oshawa's Civic Recreation Complex. Visit www.POSAlliance.ca for details and registration.

— Jay Kivell, Jay Kivell & Associates, POSA Committee Member



## **POSA Fall Forum** INTRODUCTION TO SYNTHETIC TURF & MAINTENANCE

**Date:** November 10, 2011 **Place:** Civic Recreation Complex, Oshawa, Ontario



Following up on last year's highly successful professional development opportunity, this repeat session is offered under the leadership and co-ordination of the Parks and Open Space Alliance and brings together leading industry speakers on the topic of synthetic turf and also provides practical hands-on turf maintenance opportunities.

#### Program

- The Municipal Perspective
- Understanding Construction
  - Synthetic Turf Maintenance
  - Meet With Exhibitors
  - Optional Facility Tour

Visit www.POSAlliance.ca for complete details and online registration.

## Turfgrass Education Initiative to Help Rural Communities

**JULY 29, 2011.** Safe school grounds and high-quality municipal sports fields maintained without traditional pesticides are the focus of a new University of Guelph-based initiative. The Turfgrass Outreach Project (TOP) supports rural ground-keepers across southern Ontario, providing workshops, training programs and an online knowledge centre.



The project is run by scientists and educators from the Guelph Turfgrass Institute and is supported by the Knowledge Translation and Transfer program, a new initiative under the University's partnership agreement with the Ontario Ministry of Agriculture, Food and Rural Affairs

(OMAFRA). That program funds projects that turn research knowledge into use in the agricultural, food and rural sectors.

Without cosmetic pesticides (banned since 2009), rural groundskeepers have had to make major changes to manage school and municipal sports fields. But so far, public outreach has focused on the impacts on residential lawns and urban sports fields. This project is looking to address rural sports fields, said Eric Lyons, a professor of plant agriculture and TOP project manager.

"Urban areas have often had municipal restrictions in place for a while, but in many cases, rural communities have had to adapt very quickly to managing turf without cosmetic pesticides," Lyons said. "The education and outreach to deal with that just isn't in place in rural communities like it has been in urban centres."



In response, TOP is pulling expertise from the Guelph Turfgrass Institute, U of G's Ontario Agricultural College and its School of Environmental Design and Rural Development, and OMAFRA to create accessible educational opportunities for rural groundskeepers. It's also partnered with the Sports Turf Association.

"We welcome the chance to learn more about the specific challenges faced by rural schools and municipalities," said Nicole Markwick, TOP's project co-ordinator. "For example, the safety of sports fields is important because they are used year-round for various sports and events that impact rural communities economically, socially and environmentally."

TOP also aims to foster stronger networks for continuing education on sustainable resource management for rural turfgrass managers. It has also partnered with community organizations.More information about the Turfgrass Outreach Project is available online at www.uoguelph.ca/turfgrassoutreach. You can also contact Nicole Markwick at 519-824-4120, Ext. 52251, turfgrassoutreach@uoguelph.ca.

## **Sports Turf Association's**

## Sports Turf Management and Maintenance Course

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## **The Benefits of Parks & Open Spaces**

Deborah Whitehouse, Senior Director Guest Relations – Gardens & Nature, NPC

This article is intended to share information on the benefits of parks and open spaces in our communities. While commonly known benefits such as improved health, wellness (physical/emotional), recreation (passive and active), education and security, habitat, environment, biodiversity, economics and adjacent property value enhancement have been well documented, the focus of this article is on some lesser known and emerging benefits. These lesser known benefits include improvements to the environment through energy production/ conservation, emergency uses, environmental "filters," and food/renewable resource production.

#### Conservation

We hear much in the news these days about climate change. Environment Canada defines it as "a long term change in weather over time." To combat climate change, new concepts are emerging through technology. For example, wind farms over forests, while feasible from an engineering perspective, must also provide for conservation and environmental principles in forests, whether protecting trees or bird flight and migration paths (see: www. dwworld.de/dw/article/0,,15281635,00. html. The Ontario Ministry of Natural Resources is contemplating how solar farms might be incorporated into its parks, conducting policy reviews on this and other forms of renewable energy (see: www.mnr.gov.on.ca then, from the home page, search - renewable energy strategic policy review).

Another popular new initiative in various sectors is the establishment of Greening Committees. Various government and non-government agencies embraced energy conservation in the 1970s in response to then rising oil prices, and efficiencies were found as a result. Greening Committees are currently being created in response to not only the current need to conserve energy in light of rising energy costs and to combat climate change, but are also being sold on solid business cases to reap associated cost savings. These committees can also bring forward additional green ideas. Agendas at meetings focus on such items as environmental initiatives, waste management/recycling and energy savings opportunities. The key purpose is to bring forward new energy saving/green ideas for action and implementation, investigate/ apply for applicable energy grants, create

## NIAGARA PARKS Commission

Established in 1885, The Niagara Parks Commission (NPC) is a Crown Agency of the Ontario Government. The core purpose of NPC is to preserve and enhance the natural beauty of the falls and the Niagara River corridor for the enjoyment of current and future visitors while being financially self-sustaining. Certainly, the vision of our founders allowed for a small park surrounding Niagara Falls to grow to include lands covering the full length of Niagara River, for mandated protection and enhancement and so much more. Ideally, all can agree it is important to protect our precious parklands by "thinking globally" and "acting locally."

proposals and support corporate greening goals by meeting with each other regularly to discuss challenges, accomplishments and new ideas.

Beyond establishing a Greening Committee at Niagara Parks, some additional greening projects include:

- Waste diversion: recycling and composting
- *Spare the Air*: Emissions Reduction Program
- Policy, inventory and monitoring projects: e.g. habitat restoration, prescribed burns, education and volunteer programs with sustainability themes
- Legends Golf Complex Environmental Management Plan
- NPC trademarked green products and procurement
- Energy Audit and Conservation Program

#### **Emergency Uses**

Japan has a number of examples in recent memory where public parks and open spaces were crucial as places for establishing temporary shelter during emergencies. In big cities with tall buildings falling down, a lack of such spaces to run to during emergencies can literally mean the difference between life and death. The Kobe earthquake and the 9/11 twin tower attack in New York City are both grim reminders that open spaces are important. Beyond better preparation for crises like these, open space such as the Memorial Park in New York City at the ground zero site provides a more traditional purpose as a place of remembrance, also often served by our parks.

#### **World Crops Study**

Beyond community gardens, *Think Globally, Act Locally* is a way to describe the new Vineland Research and Innovation Centre's (VRIC; Vineland, ON) World Crops research program. In 2009, Vineland Research and Innovation Centre initiated a world crops study to investigate grower and locally grown ethnic vegetable market

## POSA HIGHLIGHT Presented in June in St. Catharines, Ontario

opportunities. New crops for Canadian farmers and adequate supply to the marketplace are key to the research.

VRIC has partnered with the Ontario Fruit and Vegetable Growers' Association and along with federal/provincial funding, has initiated production trials. This year, field trials were conducted on a number



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