CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

2005 Issue 3 • Volume 16 • Number 3

Rip Van Winkle and Turfgrass Fertility

I feel like Rip Van Winkle, the Dutchman in the Washington Irving tale who fell asleep atop a Catskill knoll and awoke 20 years later only to realize how much the world had passed him by. Before I "fell asleep," potassium was a regular macronutrient, required in roughly equal amounts to nitrogen. By the time I "woke up," many turfgrass managers deemed potassium the most important nutrient, required at levels as much as six times that of nitrogen.

I suspect a few things happened during the period of my slumber that could lead one to think they need more potassium. First, there is more soil with high salinity content today than in past years, and additional potassium can help adjust those sodium problems. Second, treatment methods embraced by soil-consulting firms require more potassium. And third, although evidence suggests that potassium can enhance drought and wear tolerance, there is no evidence that most golf courses lack the required amount of potassium.

Now that I am awake again, it is clear to me that no one is reading the research material available on potassium. Gratuitous potassium applications have become the norm regardless of the real need.

Leaching, Leaching, Leaching

Sodium is detrimental to plant and soil health. Increased use of poor quality irrigation water, especially water that is high in sodium, has led to a perceived need to increase the amount of potassium. In addition, areas with low rainfall exacerbate sodium accumulation problems by limiting leaching.

Bob Carrow, a professor at the University of Georgia, writes that at most potassium is required in equal amounts to nitrogen. His findings are obvious to other plant researchers. It's a mystery how his findings, and those of other researchers, have been misinterpreted to the point that some turf managers use up to six times as much potassium as they do nitrogen.

Carrow has a mantra to help turfgrass managers understand the most effective means of solving sodium problems: "Leaching, leaching, leaching" he said during seminar after seminar and in almost every article he has written on the subject. Consequently, the leaching of harmful cations, or positively charged ions, such as sodium, will also leach important cations, such as potassium. Therefore, more potassium must be applied but in equal proportion to nitrogen.

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This Times

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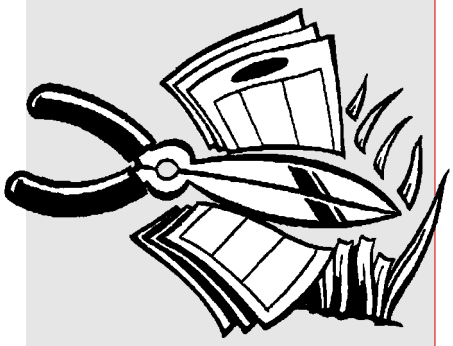
Clippings

Soldat is working toward a Ph.D. degree in Horticulture/Plant Science at Cornell. His research and dissertation, "The Source of Phosphorus in Runoff from Turfgrass," examined the relationship between soil test P levels and P losses from turfgrass areas.

This is a high honor for Maria in a very competitive contest. She is pursuing her M.S. degree with Professor Peck investigating the ecology of annual bluegrass weevil.



Soldat Wins PPI Fellowship

Douglas J. Soldat, Cornell Turfgrass Ph.D. candidate, was awarded the J. Fielding Reed PPI Fellowship. Dr. J. Fielding Reed (1912-1999) served as president of the Potash & Phosphate Institute (PPI) from 1963 to 1975. Throughout his career Dr. Reed always encouraged agronomic excellence and during retirement years he continued to speak for high standards in research, teaching, extension education, and in other phases of agronomic work. PPI began an annual program in 1980 that awards Fellowships to several deserving students in soil and plant science.

Soldat is working toward a Ph.D. degree in Horticulture/Plant Science at Cornell. His research and dissertation, "The Source of Phosphorus in Runoff from Turfgrass," examined the relationship between soil test P levels and P losses from turfgrass areas. In identifying the major sources of this loss, his hypothesis is that microbial decomposition of clippings is a major factor. Born in Wisconsin, Doug earned his B.S. and M.S. degrees at the University of Wisconsin–Madison. His aspirations include teaching and research at the university level to contribute further to the understanding of how P and K cycle in turfgrass systems.

Diaz Receives Award

Maria Derval C. Diaz won Third Prize for Oral Presentation in the Graduate Student Paper Competition at the 2005 Eastern Branch meetings of the Entomological Society of America, held March 20-22 in Harrisburg, PA.

Her paper, coauthored with Dan Peck, Turfgrass Soil Insect Ecologist at Cornell's Agricultural Experiment Station in Geneva, NY, was titled "Population Fluctuations of the Annual Bluegrass Weevil in Golf Course Landscapes."

This is a high honor for Maria in a very competitive contest. She is pursuing her M.S. degree with Professor Peck investigating the ecology of annual bluegrass weevil.

Calendar of Upcoming Events

November 15-17, 2005
Empire State Green Industry Show (formerly the NYSTA Turf and Grounds Exposition)
Rochester Riverside Convention Center, Rochester, NY
Info: NYSTA (518) 783-1229 or (800) 873-8873
http://www.nysta.org/greenshow/home.html (trade show info)
http://www.nysta.org/greenshow/program.htm (conference info)

February 1, 2006
2006 Turfgrass Advocacy/NYSTA's Lobby Day
Empire State Plaza, Albany NY
Info: NYSTA (518) 783-1229 or (800) 873-8873

February 27, 2006
Southeast Regional Conference
Marriott Westchester, Tarrytown NY
Info: NYSTA (518) 783-1229 or (800) 873-8873

March 6, 2006
Western Regional Conference
Buffalo/Niagara Marriott, Amherst NY
Info: NYSTA (518) 783-1229 or (800) 873-8873

March 30, 2006
Adirondack Regional Conference
Lake Placid Resort, Holiday Inn, Lake Placid NY
Info: NYSTA (518) 783-1229 or (800) 873-8873

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Scanning the Journals

An Aspirin a Day for Heat Stress?

As the summer months progress our cool season turfgrasses begin to experience typical signs of temperature induced decline. This decline is associated with depressed rates of photosynthesis (energy production) due to its inefficiency in fixing carbon at high temperatures into useful energy. However, heat stress produces a multifaceted stress response that involves a number of metabolic activities leading to cell death.

Researchers at Rutgers University have been exploring the heat stress phenomenon for several years and have identified a number of factors that will reduce overall stress. Recently, a study was conducted investigating the application of salicylic acid (SA), the active ingredient in aspirin, for improving heat tolerance of Kentucky bluegrass.

The researchers applied several rates of SA to bluegrass growing in a greenhouse and measured a number of physiological stress responses. They found that there were significant reductions in the amount of free oxygen radicals that indicate the reduction in stress response.

Oxidative damage is well known to be a key aspect of heat stress. Other products, such as cytokinin-based products including seaweed-derived fertilizers, have also been shown in the Rutgers program to reduce injury associated with heat stress. More research is needed to validate the benefits of this approach under field conditions, but the mechanism for improving this stress tolerance appears to be well understood.

From: He, Y., et al. 2005. Effects of salicylic acid on heat tolerance associated with antioxidant metabolism in Kentucky bluegrass. Crop Sci: 45:988-995.

Air Cooled

Heat stress and plant moisture management often includes regular light applications of water, often called syringing. Syringing is thought to provide temporary reductions in surface temperatures thereby alleviating the stress associated with drought and heat. In southern climates, where heat stress of cool season turfgrasses is orders of magnitude greater than in northern climes, fans for air movement are often used to reduce stress.

Researchers at Auburn University have been investigating the use of syringing and air movement as a means of reducing surface temperatures of creeping bentgrass putting greens. A two-year study was conducted in Auburn, AL investigating the effect of fans alone, syringing alone and fans plus syringing on a creeping bentgrass putting green.

Soil temperatures were reduced significantly by any treatment that included fan use. Syringing alone had little to no effect on soil temperature and in some cases was shown to decrease root length density. Fans plus syringing reduced the time the soil temperature was at or above the critical temperature for injury by two to three hours compared to no cooling or syringing alone.

The use of fans does not receive the attention it deserves as a means of improving heat stress tolerance and it appears, based on this study, that syringing is overrated. A comprehensive cooling program that incorporates watering and air movement will be critical during high temperature periods.

From: Guertal, E.A., et al. 2005. Fans and syringe application for cooling bentgrass greens. Crop Sci: 45: 245-250

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Will You Be There?

2005 Empire State Green Industry Show

November 15–17, 2005

Rochester Riverside Convention Center, Rochester, NY
www.nysta.org/greenshow/program.htm

CUTT

Rip Van Winkle

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Science vs. Theory

Most turfgrass managers attended a Soils 101 class during formal turfgrass education. One of the basic tenets of soil nutrient management is testing for nutrients in the soil that might be available to the plant and applying those nutrients to elicit a response.

This fundamental principle of soil nutrient management that nutrients are applied to elicit a response makes sense. However, nutrient applications based on some cation balance theory rather than scientific research, which is promoted by many soil consultants, is irresponsible.

If you are concerned about cation balances such as potassium, testing for pH levels is a simple method for evaluating how cation balance can be adjusted. The current trend to interpret soil tests based on cation balance was adapted from production agriculture and has never been proven to be significant for turf nutrient management. In fact, a few recent studies have refuted its application to turf.

Cation balance interpretations typically lead to application rates of nutrients such as calcium and potassium that are higher than necessary when compared with interpreting based on plant response. Potassium is viewed by some as more important than nitrogen because potassium can "be out of balance" and can be leached out of the soil. Therefore, consultants believe potassium is required in significantly higher amounts regardless of plant response. I'm feeling like Rip again.

Diminished Stress Tolerance

Potassium is an important ion for managing water. It is involved in cellular hydraulics as well as regulating stomatal conductance that governs water movement throughout the plant.

A significant amount of research was conducted about 15 years ago on the subject of potassium's role in water management throughout the plant. Research showed that adequate levels of potassium must be maintained in the soil to enhance a plant's stress tolerance. The 6-to-1 potassium-to-nitrogen ratio that some turf managers have adopted since I fell asleep could be adversely affecting stress tolerance.

A recent study at Cornell University showed that turf treated with high rates of potassium (not in a 1-to-1 ratio with nitrogen) was significantly more susceptible to snow mold and slower to recover than turf that did not receive potassium. A subsequent study at the University of Massachusetts supported these findings.

Simplify

We can all learn something from Rip Van Winkle. When he awoke, there was much disbelief about him and his story and from him about how the world had changed. No one believed he had slept for 20 years, and he could not comprehend that he no longer was a subject of King George—and his nagging wife. He always had appreciated the simple things in life and was more accepted by the younger members of society who could learn from his simple wisdom.

I find that I anger some people in the turf industry when I give talks about how detrimental high rates of potassium can be to plant health. I can tell by looking into the eyes of those in the audience the turf managers who have embraced the practice of high application rates of potassium and those who never have understood why so much potassium was needed.

It's time for our industry to take a step back to simpler times when potassium applications were not made gratuitously, but were based on science and expectations of performance. Maybe it's time we all woke up.

Frank S. Rossi

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CUTT

The Conversation Continues on the Precautionary Principle

To the editor:

With interest I've been following [your] discussion of the Precautionary Principle.

I can appreciate the concerns expressed by Larry Wilson of the NY Alliance for Environmental Concerns. His probing questions suggest a "misplaced" and "ill fit" of how the Precautionary Principle is obfuscated by impressionable and misguided politicians. I could not agree more, especially where politicians in Quebec, Ontario and Ottawa "skewed" the principle to coincide with their views to justify anti-pesticide actions.

In short, the Canadian judgements came after the activists in Canada adopted the contorted anti-pesticide American activists' agenda and strategy as their own. [As a] result (and without adequate industry opposition) frightened policymakers yielded to further restrict pesticide use. Unfortunately, and imprecise Precautionary Principle or "Precautionary Policy" using a few questionable anti-pesticide studies (without challenge to the contrary) offered cover and enough cause that [politicians] believed sufficient to alter policy that's negative to lawn care.

The current adaptation of the Precautionary Principle has fault. There appears to be no clear recognized consensus by scientists, regulators and politicians as to what constitutes the components, and their relative weight, in an operating model to work from in the risk assessment analysis. I agree with Dr. Suzanne Snedeker that "sound science" must be central to the Principle. If following this undertaking in Canada, then sharp peer review and critique should have been used in a better and more clearly defined Precautionary Principle to dissuade authorities from proceeding further against lawn care.

Over the past four years since Albany enacted 48-hour lawn care neighbor notification, the New York State Lawn Care Association has repeatedly been confronted in county after county with professional anti-pesticide activist tirades holding up the Precautionary Principle as good reason that pesticide use should be further restricted. It's uncomfortable to hear these folks define their Precautionary Principle as the standard for perceived risk assessment and [a claim] based on any suggestion of harm is enough for more restrictive policy.

Equally distressing, these same protagonists say society cannot trust nor accept reputable, authoritative and prevailing science from universities. They claim university findings are too easily compromised or tainted by beholding to research dollars from industry. And for industry, even less confidence because monetary self-interest overrides trustful research. So, like in Canada, another "P" principle reigns supreme, the Political Principle.

In my view, the Precautionary Principle should be understood primarily as the science-based process component in evaluating risk assessment and not the ultimate arbiter for policy.. Politics should not be part of the process where there's too much temptation for bias. Otherwise, if included, science becomes degraded and even meaningless. Distinctly separate, and after Precautionary Principle findings, the final policy determination and responsibility rests (as it should) with appropriate regulatory and political officials. A science-based Precautionary Principle serves as a tool in the risk evaluation process—open to scrutiny and questions [based on] established standards. What's politically "in" or "fashionable" at the moment should not be an integral part of this process.

Donald W. Burton
New York State Lawn Care Association

Send Us A Letter

We enjoy receiving letters from readers reacting to the articles and information presented in *CUTT*. Encouraging a free-flowing, two-way communication between our readers and Cornell's Turfgrass Team can only make *CUTT* a better, more relevant publication.

Send your comments to *Cornell University Turfgrass Times*, 134A Plant Science Building, Cornell University, Ithaca, NY 14853, or via email to fsr3@cornell.edu.

Readers Respond

I agree with Dr. Suzanne Snedeker that "sound science" must be central to the Principle. If following this undertaking in Canada, then sharp peer review and critique should have been used in a better and more clearly defined Precautionary Principle to dissuade authorities from proceeding further against lawn care.

CUTT

A Visit to Farmlinks
A Research and Demonstration Golf Course

Program Spotlight

I visited Farmlinks with a group from Pacific Golf Management, and we were accompanied by Toro and Simplot Partners representatives.

The Farmlinks golf course is located on the 3,500 acre Pursell Farms near Sylacauga, Alabama. Farmlinks is billed as the world's first and only research and demonstration golf course, and Pursell Technologies, who are the makers of Polyon coated fertilizers, have formed partnerships with leading companies in the golf and turf business in order to build and operate Farmlinks.

Toro has provided all of the equipment, Club Car has provided all golf carts, and Syngenta is involved with plant protectants. The participating companies then bring customers, potential clients and distributors to Farmlinks on a regular schedule throughout the year. Two groups are brought through each week, on average, with a stay entailing two or two and a half days. A total of about 1,000 visitors are invited each year; approximately 750 of those visitors are from the golf industry.

The Experience

With that rather general introduction, it is probably easiest to convey a sense of the "Experience at Farmlinks," as it is called, by simply describing what I observed as I visited the facility for the first time in February 2005. I visited Farmlinks with a group from Pacific Golf Management, and we were accompanied by Toro and Simplot Partners representatives.

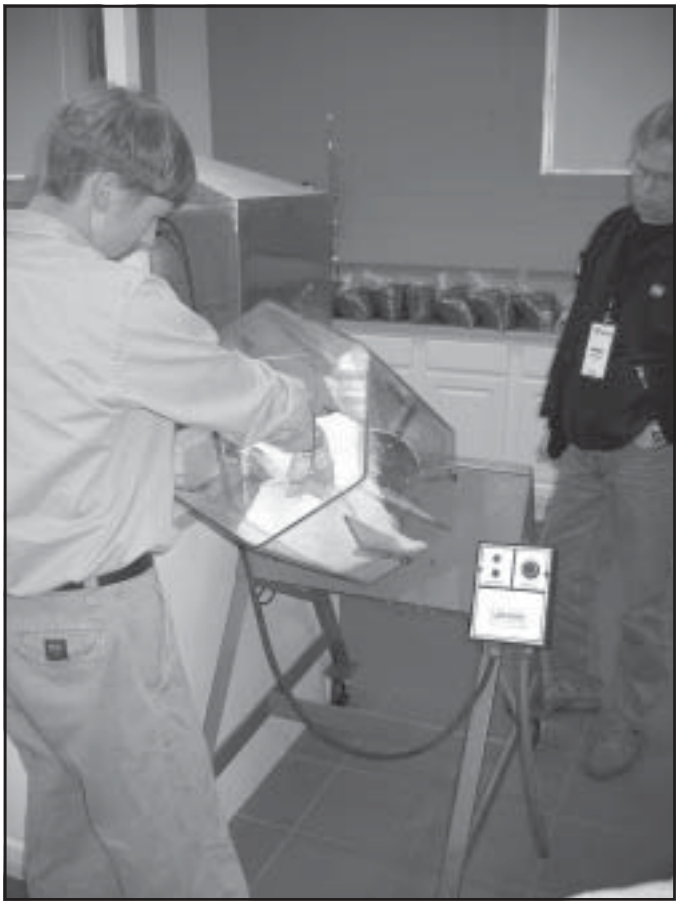
After meeting in Birmingham, we made the one hour drive to Pursell Farms, arriving just before lunchtime on a Wednesday morning. All visitors stay at Parker Lodge, which sits just behind the 17th green of Farmlinks Golf Club. We arrived at the impressive lodge and were greeted by Pursell Technologies staff. A fire was burning in the massive stone fireplace, and a black bear stood stuffed just to the right of the door. Other hunting trophies adorned the walls of the lodge. We were each assigned a suite in

Parker Lodge, where all visitors to Farmlinks stay, sits just behind the 17th green of Farmlinks Golf Club.

Guest suites at Parker Lodge are named after distinguished people, such as Dr. James Watson, and contain appropriate furnishings.

the lodge for our stay; Dr. James Watson has a suite named after him, with appropriate furnishings, and the other suites are named after fertilizer products or distinguished people. After that warm welcome, we took a Polyon bus to the clubhouse for lunch, and then we continued on into Sylacauga to visit the Polyon factory.

At the factory, we met with the director of product testing and quality control in his laboratory. He explained to us how Polyon products are tested to ensure integrity, and the polymer application process was demonstrated in a laboratory-sized mixing drum. Then we went next door to a well-appointed theatre, where popcorn, candy and drinks are provided before one is instructed to sit down and listen to Dr. Jeff Higgins explain the various types of nitrogen fertilizer and their associated release characteristics.



A Pursell Technologies staff member demonstrates the polymer application process at the Polyon factory.

This was probably the most educational aspect of the trip, as Dr. Higgins went through each class of nitrogen fertilizers, which he defined as fast release, slow release and controlled release. In fact, the Golf Course Superintendents Association of America (GCSAA) offers continuing education credits for this session. He further subdivided the primary classes of nitrogen fertilizers, and I will spare the details here; suffice it to say, however, that this thorough discussion of nitrogen products touched on all the commercially available forms of nitrogen fertilizer. The audience was taught, or reminded, about the release mechanisms of different nitrogen fertilizers. At the end of the two and a half hour presentation, curtains were opened at the front and side of the theater and a factory floor was revealed through glass windows. Below was Polyon fertilizer production, amidst mixing cylinders, conveyer belts and screens.

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Above: A practice green at the Hurdzan-Fry designed Farmlinks Golf Club at Pursell Farms in Sylacauga, Alabama. Below: A collage of images of Farmlinks Golf Club. The tees, roughs and fairways feature a variety of grass and soil types. The beautiful facility is billed as the world's first and only research and demonstration golf course.

After this informative presentation, we returned to Parker Lodge, where the fire was bigger and we were soon seated in the dining area for a freshly cooked meal of steaks and other tasty food. A continuing refrain of our hosts at Farmlinks was that we should enjoy ourselves, and the food seemed especially prepared to satisfy the appetites of hungry golf course superintendents. When dinner was complete, we retired to the ground floor of Parker Lodge, where—if my experiences are any indication—one is allowed to lose at billiards, ping pong and Playstation, all in the same evening.

Day Two

The next day began with a traditional Southern breakfast of bacon, eggs, grits, and biscuits and gravy. A representative from Toro then made a presentation, first in the conference room at the lodge, where he explained Toro's role at Farmlinks and the methodology that Toro uses when developing innovative products. Pictures were shown of some prototype equipment and technologies, and we then went to the turf nursery to operate and observe some prototype equipment for ourselves.

That was the end of the formal program at Farmlinks, and after a catfish lunch, half of our party went fishing, and the rest of us played golf at the Hurdzan-Fry-designed Farmlinks Golf Club. The course is notable for the various grass types planted there. Most tees, rough and fairways are Tifsport Bermuda grass. Greens are A-1/A-4 bentgrass mix, although the practice green also has L-93 and G-2 in some sections and that practice green is also divided into three sections, each with different rootzone mixes. One section is sand-peat, one is straight sand, and the other is sand-Profile. The greens on the

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For turfgrass managers, Pursell Farms and Farmlinks Golf Club really are a 3,500 acre recreation and education facility, as advertised on their website.

Dean Henry's Response to Cornell Guidelines Language

Editor's note: The following letter is from Susan A. Henry, Ph.D., the Ronald P. Lynch Dean of Cornell's College of Agriculture and Life Sciences to Mr. James Diermeier, CGM/CNP, President of New York State Turfgrass Association, Inc. Dean Henry was responding to the publication of erroneous information in an official Cornell publication. It was written in July 2005.

Dear Mr. Diermeier:

Thank you for your letter of May 25 outlining the turfgrass industry's issues with the most recent edition of *Cornell's 2005 Pest Management Guidelines for Commercial Turfgrass.*

As Dean of the College of Agriculture and Life Sciences, I want you to know I share your frustration, and, indeed, anger regarding the inappropriateness of the language contained on pages 21-25. I am embarrassed that such egregious opinions were published and distributed in a publication from Cornell.

As was explained to me, approximately 50 pages of new information were added to the turfgrass guidelines this year. Some of this information originated in a series of articles published seven years ago in a turfgrass trade journal. With the best of intentions, the Cornell turfgrass team felt that this information would be helpful to the professional turfgrass managers who use the guidelines. It was unfortunate and inexcusable that they did not proof the information more carefully nor remove the offensive language in the section on fungicide use before publication.

To address the issue, let me assure you we are taking appropriate steps to rectify the situation and to make sure this type of mistake does not happen again. Here are the actions that I and others have undertaken:

- I am conducting a personal investigation to determine how this language came to be published in the publication and who is responsible, and am taking appropriate actions to ensure this type of error does not occur again. Furthermore, I have spoken personally to the individuals responsible to ensure that they do not promulgate such opinions in the future nor allow such opinions to affect work associated with Cornell. I am taking administrative action commensurate with Cornell rules to hold these individuals responsible.
- Let me assure you that Frank Rossi, who is the leader of Cornell's turfgrass team, was not responsible for the situation. He feels even worse than I do and is working with me to ensure that this will never happen again. Immediately after the incident occurred, but prior to my being informed, Frank spoke directly with many individuals in the turfgrass and related industries who brought these concerns forward. He also published an acknowledgment of the concerns and a retraction in Cornell's *ShortCUTT* newsletter on May 23, 2005, which went to all NYSTA members and additional subscribers in the turfgrass industry.
- The online version of the guidelines was edited, and the inappropriate language removed as soon as the concerns were raised.
- The remaining copies of the 2005 turfgrass guidelines have been pulled from distribution. People interested in procuring them are being directed to the online version.
- Frank Rossi is preparing a letter to all members of the turfgrass industry who received a copy of the guidelines that addresses the mistake. He will offer his expertise and the expertise of our director of communications, Linda McCandless, should someone be contacted by the media or an advocacy group.
- Frank Rossi and the Cornell turfgrass team have developed a more rigorous editorial process to insure this type of mistake will not be repeated in the turfgrass guidelines.
- The editorial process by which the entire Cornell guideline series is produced is undergoing a review to prevent this type of error in the future. I will insist that a single editor be identified for each guideline who will take responsibility for content.

I would also like to extend my personal apology to you and members of your industry for the negative perceptions of the industry that were promulgated in this publication, for which we accept full responsibility. Furthermore, I am offering to personally meet with you and members of your industry to address the concerns you voiced in your letter.

continued on page 10

As Dean of the College of Agriculture and Life Sciences, I want you to know I share your frustration, and, indeed, anger regarding the inappropriateness of the language contained on pages 21-25. I am embarrassed that such egregious opinions were published and distributed in a publication from Cornell.

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I want you to know that we at Cornell recognize and greatly appreciate the valuable contributions your industry and turf managers make to the citizens of New York as environmental stewards. In addition to being knowledgeable and conscientious about integrated pest management, your industry provides recreational opportunities, preserves open green space, provides wildlife habitats, and prevents soil erosion. We applaud those efforts.

Farmlinks

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course are all 85%-15% sand-Profile. A chipping green has Champion Bermuda in one section, Tifdwarf in another, and TifEagle in another. Four of the fairways are planted to Zorro zoysia. One par 3 fairway is Sea Isle paspalum. One fairway is Tifway 419, and the hybrid bluegrass called "Thermal blue" is planted in the rough of one hole. The par three tees were overseeded with ryegrass, and the fourth fairway was overseeded with ryegrass; one end of that fairway included trials of different overseeding practices.

A Remarkable Place

We spent one more night and played golf again the following morning. For turfgrass managers, Pursell Farms and Farmlinks Golf Club really are a 3,500 acre recreation and education facility, as advertised on their website. Farmlinks is a remarkable place and the products of the sponsoring companies are not oversold, although one is certainly aware of what companies have made this experience possible. I would encourage anyone who has the opportunity to visit there to do so. Farmlinks is almost an amusement park for golf course superintendents. The combination of sport, turfgrass education, product demonstrations, and Southern hospitality is hard to beat.

Micah Woods

Dean Henry

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I also wish to use this opportunity to convey the opinions that are more generally held by myself and the rest of the Cornell turfgrass team.

I want you to know that we at Cornell recognize and greatly appreciate the valuable contributions your industry and turf managers make to the citizens of New York as environmental stewards. In addition to being knowledgeable and conscientious about integrated pest management, your industry provides recreational opportunities, preserves open green space, provides wildlife habitats, and prevents soil erosion. Members of your industry cooperate with Soil and Water Conservation districts, Audubon International, the Department of Environmental Conservation, and many other organizations, and we applaud those efforts.

I would also like to express my sincere appreciation for the close working relationship between Cornell and the turfgrass industry. Your support of our extension and research programs is vital to the program's success and one of the most valued partnerships in the college.

In closing, let me reiterate my commitment to the College's future relationship with the turfgrass industry. We will continue to support turf managers as environmental stewards with research, education and extension. We will help your members educate the public on the value of the turf industry to the environment and the economy of New York. These shared values with Cornell's Land Grant mission are vital to both of us and another reason why this current situation is so difficult.

I trust we can weather the current strain in the relationship between Cornell's College of Agriculture and Life Sciences and members of the turfgrass industry produced by this unfortunate incident so we can move forward with the same positive momentum we have all worked so hard to build and sustain in the past. We look forward to solving current difficulties so we can continue to grow together.

Please contact my office with ideas as to when we might meet and who should be involved.

Sincerely,

Susan A. Henry, Ph.D.
The Ronald P. Lynch Dean
College of Agriculture and Life Sciences

2,4-D

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In a highly debated study, a small increase in the incidence of a type of blood cancer called canine lymphoma was observed in pet dogs of owners whose lawns were frequently treated with 2,4-D. This increase was seen only in the dogs that were allowed access to areas that had been treated with 2,4-D. However, this study relied on homeowners to remember the pesticides that they had used years ago, and was criticized for the lack of information on the actual exposure of the dogs to 2,4-D and other lawn chemicals.

2,4-D may act with other carcinogens to "promote" lung tumors in mice. Urethan is a known carcinogen. Mice that were exposed to a commercial formulation of 2,4-D in drinking water, followed by an injection of urethan, developed more lung tumors than the mice that were injected with the same carcinogen, but not given 2,4-D.

Human Cancer Risk

There are no reports that indicate a direct link between 2,4- D exposure and cancer in humans. However, there is some concern about higher rates of a type of cancer called non-Hodgkin's lymphoma among farmers, agricultural workers, manufacturing workers, and pesticide applicators who were previously exposed to 2,4-D. But results from different studies are not consistent. While one half of the studies indicated higher rates of non-Hodgkin's lymphoma among populations exposed to 2,4-D, the other half did not.

Often in these studies, 2,4-D exposure was accompanied with exposure to many other chemicals, including other pesticides and dioxin contaminants of 2,4-D. This makes it difficult to assess whether exposure to 2,4-D, some other chemical, or another factor caused the increase in cancer rates reported in some of the studies. The incidence of non-Hodgkin's lymphoma needs to be followed further in studies of workers who were exposed to 2,4-D during its manufacture or application.

Most studies have not found a relationship between exposure to the group of chlorophenoxy herbicides and the development of a type of cancer called soft-tissue sarcoma in humans. These studies did not look at exposure to 2,4-D alone, but included populations exposed to 2,4-D and other related herbicides.

Conclusions

Current evidence does not indicate that exposures to 2,4-D are linked with an increase in the incidence of breast cancer in humans or in experimental animals. The few studies of women who were exposed through their occupation to 2,4-D and other chemicals have not shown an increase in the incidence of breast cancer. 2,4-D fed to experimental animals over long periods of time did not cause an increase in the incidence of breast tumors. There is very limited evidence that 2,4-D can act as a tumor promoter and affect the immune system. Further studies are needed to understand these mechanisms and to determine if they affect breast cancer risk.

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While one half of the studies indicated higher rates of non-Hodgkin's lymphoma among populations exposed to 2,4-D, the other half did not.

Most studies have not found a relationship between exposure to the group of chlorophenoxy herbicides and the development of a type of cancer called soft-tissue sarcoma in humans. These studies did not look at exposure to 2,4-D alone, but included populations exposed to 2,4-D and other related herbicides.

There is very limited evidence that 2,4-D can act as a tumor promoter and affect the immune system.

CUTT

A Healthy Ecosystem

One study observed an increased incidence of the "brain astrocytoma" tumor in male rats fed 2,4-D for two years. However, these results could not be repeated in a second study on rats that were fed higher doses of 2,4-D.

The Impact of 2,4-D on Breast Cancer

2,4-D (2,4-dichlorophenoxyacetic acid) is one of the most widely used herbicides in the United States. 2,4-D belongs to the group of related synthetic herbicides called chlorophenoxy herbicides. The chemical structure of 2,4-D resembles indoleacetic acid, a naturally occurring hormone produced by plants to regulate their own growth. This resemblance allows 2,4-D to artificially regulate plant growth. While 2,4-D itself is rapidly broken down in the soil, 2,4-D preparations made before the mid-1970s were often contaminated with more persistent chemicals called dioxins.

History

2,4-D was originally developed in 1941 to increase plant growth. Soon, it was discovered to have an even more useful role in agriculture as an herbicide to control weed growth. A mixture of 2,4-D and a related chemical called 2,4,5-T was found to be a more effective herbicide than 2,4-D alone. This mixture was called Agent Orange and was used by the U.S. during the Vietnam War to increase the visibility for war planes by destroying plant undergrowth and crops. The usage of 2,4-D and 2,4,5-T increased through the next 15 years. In response to its potential to cause cancer and other health concerns, use of 2,4,5-T was banned by the U.S. Environmental Protection Agency (EPA) in 1983.

Current Use

During the early 1990s, 42 million pounds of 2,4-D were used per year on U.S. croplands making it the fourth most used herbicide in U.S. agriculture. At the same time, the annual use of 2,4-D in New York State was estimated to be 141,665 pounds, making it the seventh most used herbicide in this state. 2,4-D's primary use in agriculture is to control weeds in wheat and corn fields. It is used, but much less so, in orchards to prevent fruits from dropping prematurely. 2,4-D has many nonagricultural uses. It is used to control weeds in forests, rangelands, pastures, parks, athletic fields, golf courses, ponds, and lakes, and to clear land for roadways and rail tracks. In addition, it is used in home lawns and gardens to control broadleaf weeds like dandelions. The EPA has estimated that 12 to 28 million pounds of 2,4-D are used each year in nonagricultural settings.

Animal Cancer Risk

2,4-D fed to laboratory mice over long periods of time did not cause tumors. One study observed an increased incidence of a type of brain tumor called "brain astrocytoma" in male rats fed 2,4-D for two years. However, these results could not be repeated in a second study on rats that were fed higher doses of 2,4-D.

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