CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

Winter 2001 • Volume 11 • Number 4

Legislative Impacts on the Turfgrass Industry in New York

The prevalence of pesticide-restrictive legislation is affecting how pests are managed in schools, offices, parks, right-of-ways, athletic fields, and numerous other places where we live, work and recreate. At a national level, pesticides are being phased out through the Food Quality Protection Act (FQPA) and the associated EPA pesticide review process. Although the FQPA does not directly affect the green industry, some chemicals that face scrutiny under that review are being removed from the marketplace either voluntarily or by mandate.

Turfgrass managers are impacted more directly by constraints on practices that may affect ground water, expose children to hazardous compounds, or are perceived as non-essential, cosmetic applications. Voters and lawmakers are sending consistent messages that they want more information on the pest control practices used in their environs, and they are less tolerant of the risks associated with these practices.

On a local level, many municipalities are mandating integrated pest management (IPM) programs and specifying exactly if, when, and where a pesticide may be used. For example, in 1996 the city of San Francisco enacted an ordinance that mandated IPM and banned most pesticides in public parks, buildings, buses, rights-of-way, and bodies of water. Two years later, they also passed a revolutionary pesticide reduction policy for schools. Their IPM program includes provisions for ongoing progress assessment, education and a communications strategy. These policies are amongst the most comprehensive in the country, and are considered model programs by many environmental advocates. Another west coast city, Seattle, implemented similar regulations in 1999.

Origins of Concern

The "era of pesticides" has been with us since the second world war, and concerns over environmental and human health have been part of the public discourse since *Silent Spring*

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This Times

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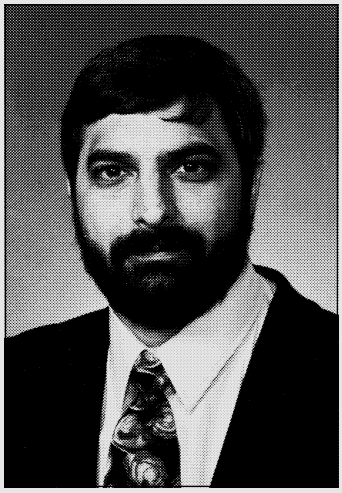
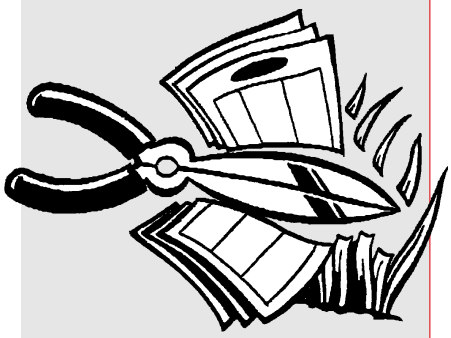
Clippings

For many years, Mike has exemplified the type of individual who gives more than he takes. He plans his program to provide the maximum benefit for the overall good of the industry.



Mike Villani



Villani Receives Outstanding Service Award

Cornell Turfgrass Team member and internationally renowned soil insect ecologist, Mike Villani was awarded the Outstanding Service Award from the Turfgrass Council of North Carolina. Dr. Rick Brandenberg of NC State University presented the Award during the 39th North Carolina Turfgrass Conference and Show in January. The following is an excerpt from Dr. Brandenberg's presentation that should ring a familiar tone from Mike's acceptance of the NYSTA Distinguished Service Award in 1999.

"There is often a need to collaborate with colleagues at other institutions to provide the necessary support to solve a particular problem. On rare occasion, an individual is fortunate enough to team up with someone who places a high priority on the benefit to the science and not on personal gain. This describes my relationship with Dr. Villani over the last several years.

For many years, Mike has exemplified the type of individual who gives more than he takes. He plans his program to provide the maximum benefit for the overall good of the industry. While Mike was on vacation with his family on the beach at Ocean Isle, he would head out to the golf course to help me study mole crickets. He has been a model of humility for many of us.

A friend since my graduate school days, Mike has always impressed me with his ethical nature of doing business and his commitment to quality. Since he is a NC State graduate, we reap the benefits of his allegiance to his alma mater. His willingness to collaborate has been a tremendous benefit to the industry and allowed us to move our programs forward at a much faster rate.

Sadly, Mike at age 47 was diagnosed with terminal pancreatic cancer in December. As a friend and colleague of Mike's, I personally thank you, the outstanding people of this organization for making the effort to extend our most sincere thanks to Mike for all his contributions."

Editor's Note: In December 2000 we learned that our friend and colleague, Mike Villani, was diagnosed with terminal pancreatic cancer. Mike, his wife Connie and their two daughters are facing significant challenges. Mike is still coming into the office a few days a week as he embarks on an aggressive chemotherapy program. He enjoys hearing from friends and coleagues via cards and letters sent to NYSAES-Geneva, Barton Hall, Geneva, NY 14456

Here's the Culprit!

A quick glance at the cover and you'll notice this is the Winter issue of *CUTT*. Obviously, we were delayed in publishing this issue as well as the pending Spring issue. We thought we would let you know how this occurred. Our editor, Frank Rossi, and his wife Barbara welcomed their son, Tucker Angelo Rossi into the world on November 30, 2000. Almost two months before he was due!

Tucker Angelo Rossi

Mom and son came home a week after the delivery, except Barbara continued to have health concerns that had her in and out of the hospital for the next three months. Needless to say our editor was distracted.

We are happy to report that Tucker is approaching a healthy 15 pounds and Mom is well enough to be giving our editor a hard time again.

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Scanning the Journals

Inorganic Amendments Field Tested

Concerns about availability, cost and the environment have increased the interest in the use of inorganic amendments in designed rootzones for golf greens and sports fields. The two most common inorganic amendments are porous ceramic clay (PCC) and calcined diatomaceous earth (CDE). These materials, when mixed with sand, have been suggested to increase plant-available water and improve cation exchange capacity (CEC) while maintaining high drainage and aeration properties.

Researchers at Iowa State University conducted a field study on a sand based golf putting green. Each treatment included 5% peat by volume and individually 10% of each inorganic amendment. The PCC treatment had 8% higher CEC than the peat control, resulting in a 100% increase in available K, 30% increase in Mg, but a 4% decrease in Ca. The pH of the sand used in the study was over 8.0, so that decrease in Ca would not be considered significant. Interestingly, the water release curves that are a measure of plant available water were not influenced by amendment.

One of the major conclusions of the study was that the inorganic amendments influence CEC and hydraulic properties of the soil differently. From a nutrient management standpoint the selective retention of K vs. Ca could be important as a result of the well-known challenges with maintaining adequate K levels in sand based systems. Still, in the absence of economic information, questions remain regarding the cost-benefit analysis of these inorganic amendments while good, reliable sources of organic amendments are still available.

From: Li, D., Y.K. Joo, N.E. Christians, and D.D. Minner. 2000. Inorganic soil amendment effects on sand-based sports turf media. Crop Sci. 40:1121-1125.

Biocontrol in Shaded Turf

Historically, it has been estimated that 20-25% of all turfgrass is maintained under vegetative or structural shade. The influence of the reduced and altered light on turfgrass growth has received renewed interest in the literature in the last several years. In fact, many of the studies have attempted to characterize the light effects on turf by eliminating the other microenvironmental factors such as humidity and temperature. Still, many turf managers know that the influence of humidity, particularly as it relates to leaf wetness and subsequently to disease incidence, are major aspects of turf adaptation to shaded environments.

Researchers at the University of Nebraska conducted a study to investigate the influence of shaded environments on biological control organisms that could manage turf diseases. Specifically, bacterial agents were applied with a backpack sprayer to shaded turf and populations were monitored. Each of the strains of bacteria increased under shaded environments. The researchers noted the difficulty in maintaining consistent measurements among the studies as a result of the variability of bacterial populations. It was suspected that the overall increase in bacterial populations may be related to reduced UV light penetrating through the shading canopy.

This is a significant contribution to the turfgrass biological control literature as we continue to try and understand the relationship among plants, microbes and the environment. It appears that higher bacterial populations are required for effective biological control, however while environmental factors are critical, there are questions regarding the relationship between plants and microbes that might influence performance.

From: Giesler, L.J., G.Y. Yuen, and G.L. Horst. 2000. Canopy microenvironments and applied bacterial population dynamics in shaded tall fescue. Crop Sci. 40:1325-1332.

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Legislative Impacts

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was published in 1962. So why do the regulations seem to be coming so fast and furiously now? Scientists weigh into the debate by quantifying risks, and capabilities in this area have improved dramatically. We are also digging deeper to examine multiple levels of effects on nontarget organisms, long-term ecological resources, and human health. Recent discoveries, such as the link between some commonly used pesticides and Parkinson's disease, remind the public how little is known. Although risks can be quantified by science, the acceptability of those risks is left to the court of public opinion. A one-in-a-million chance of a woodland newt being exposed to pesticides applied to turfgrass may be considered an acceptable risk. However, if children are involved, society has clearly indicated that any level of risk is unacceptable.

Another significant factor driving pesticide legislation is citizens' right to know when, what and where pesticides are being applied. Regulations requiring prior notification of pesticide applications and subsequent posting have been steadily increasing in both agricultural and community settings over the past decade. Although the logistical aspects of these laws are often considered onerous by the applicators, it is difficult to oppose the concept.

Lastly, and perhaps most importantly, the environmental movement has been gaining momentum. Concerns about pesticide use that were once considered fringe opinions have moved into the mainstream. Environmental advocacy groups are more numerous, better organized and more politically savvy than before. Strong coalitions have formed among diverse groups concerned about issues such as causes of cancer, effects on endangered species, workers' rights and safety, and the health and welfare of children. In state legislatures, once a pesticide-restrictive bill reaches the floor, it is difficult for a member to go on record as voting against it.

New York's Situation

Here in New York, we are acutely aware of the situation with the recent passage of the Neighbor Notification Law and pesticide restrictions in several localities. Pesticide phaseouts have been mandated for public properties in Suffolk, Albany and Westchester Counties, and the city of Buffalo. Generally, the rules apply to all areas owned by the municipality, including park land, athletic fields, golf courses, and lawns, as well as building interiors. Local restrictions on private use of pesticides are complicated by conflicts with federal and state laws. Therefore, public properties have been the primary target of such legislation.

Schools are in the public domain, and more importantly involve the potential of exposing children to hazards. Pilot IPM programs have been implemented in schools across the country, with early efforts concentrating on control of interior pests such as rodents, cockroaches and lice. The New York City school system of approximately 1,200 buildings has implemented a model IPM program, with substantial reductions in pesticide use, especially rodenticides. Most school IPM programs have expanded to include school grounds and athletic fields, and national guidelines for implementation are currently under development.

In the New York State legislature, 2000 was a busy year for environmental law. According to the Environmental Planning Lobby, thirteen bills significantly affecting the environment were passed, as opposed to only two in 1999. Two of these were signed into law: the Neighbor Notification Law, and a ban on Avitrol (an avicide used to control pigeons) in New York City. Six other bills concerning pest management were passed by the Assembly, but not the Senate. These included a ban on 2,4-D; the phaseout of pesticide use by all state agencies; the phaseout of herbicide use on utility right-of-ways; and the abolition of routine pesticide sprays in schools. Although these bills did not become law, political support for them is evident.

The Neighbor Notification Law

Lawn care professionals are feeling the heat of the environmental climate with the recent passage of the Neighbor Notification Law. The law is comprised of several components that require: 1) Prior notification of pesticide applications by schools and daycare centers, 2) Posting of lawn pesticide applications by homeowners, 3) Posting of pesticide information in retail establishments that sell pesticides for home use, and 4) Prior notification of pesticide applications to neighbors by commercial lawn care companies. Once the law was signed

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by the Governor last summer, the DEC was charged with writing regulations that reflect the letter and intent of the law. These regulations were officially proposed late in 2000, and were presented for public comment. The first component is mandatory for all schools and licensed daycare facilities statewide in July, whereas the law must be adopted by individual county governments in order for the remaining components to go into effect. Four counties, Suffolk, Nassau, Westchester and Albany, had passed the necessary local ordinances by the March 1st deadline, and the law is currently in effect in those areas.

At NYSTA's statewide conference in Syracuse in November, the law was a hot topic, with over 200 people attending a special afternoon session dedicated to discussion of this legislation. DEC officials diligently explained the newly proposed regulations, while audience members from counties that are considering opting into the law were particularly concerned with details and compliance. Numerous terms such as "spot treatments" had to be precisely defined in the regulations, and exemptions needed clarification. Some specifics of the regulations are provided in the sidebar article on page 7. Enforcement is also an issue: the DEC has concurrent authority with the counties to enforce the regulations, but extensive enforcement may be a financial hardship for both the DEC and the counties. In the Regulatory Impact Statement prepared for the state, the DEC estimated that it will cost their agency $150,000 per year to administer and enforce these regulations, and that individual counties may incur costs of an additional $50,000 or more annually. The DEC also projected that implementation of the notification procedures would cost a small lawn care company approximately $40 per account, annually.

Later in November, DEC officials were again explaining the proposed regulations—this time to a statewide meeting of Cornell Extension faculty and staff. Extension staff were keen to learn details, since they will likely provide educational support for Neighbor Notification. In January, public hearings were held across the state to discuss the proposed regulations.

The portion of the law regulating schools and daycare facilities will be administered by the department of education. Schools must establish a mechanism for notifying parents and staff prior to the application of any pesticides, interior or exterior to buildings. They must also report all pesticide usage to staff and parents three times a year. Daycare facilities are required to conspicuously post notification of pesticide usage 48 hours prior to an application. These rules go into effect July 1, 2001.

The involvement of homeowners and retail establishments is perhaps the most surprising aspect of the law. Green industry professionals have long complained that "do-it-yourselfers" are granted unfair dispensation from pesticide regulations. They assert that homeowners are both untrained and unregulated and therefore pose the greatest safety risk when using pesticides. The Neighbor Notification Law sets a precedent by requiring home applicators to post after pesticide applications to areas greater than 100 ft^2. Prior notification of neighbors, however, is recommended but not mandatory. In addition, retailers of general use lawn pesticides are required to post specified information next to each display location in their stores. These newly regulated groups will likely create enforcement challenges for the counties and the DEC.

The provision for counties to opt into most aspects of the law was a compromise forged to help bridge differences in the Assembly and Senate versions of the bill. Proponents of the law feel it is considerably weakened by the provision, whereas opponents see an opportunity to win the battle on a local level. At the NYSTA conference, speakers from RISE (Responsible Industry for a Sound Environment) and audience members discussed arguments that would deter enactment by the counties. Chief among them were:

- Potentially high cost to counties (DEC estimates ≥ $50,000),
- High cost to lawn care companies, which are local businesses,
- Health and safety are already protected by pesticide applicator training,
- Off-target drift of pesticides is already illegal,
- Pre-scheduling of pesticide applications is counter to good IPM practices, and
- Notification could be provided less onerously through a registry.

A "registry" is a list of people who want to be notified of pesticide applications. Eleven states currently have a voluntary pesticide registry, the oldest of which has been in place for twelve years. Statistics provided by RISE show that fewer that 1,000 people have signed up in any one state. Assuming that participation in a

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registry in New York would be as low as in other states, the logistics of notification would be much easier for lawn care providers. The NYS Turf and Landscape Association currently has a voluntary registry, and many in the industry are promoting its use as an efficient and complete alternative to mandatory notification of all neighbors.

The Future

Clearly the writing is on the wall that fewer pesticides are going to be available and that pest management practices are going to be more closely scrutinized and regulated in the future. The best defense for practitioners is to reduce your reliance on pesticides, better educate yourself about alternatives, and begin to experiment with new practices.

Jennifer A. Grant

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For more information, the following websites are recommended:

DEC Pesticides Management Program:
http://www.dec.state.ny.us/website/dshm/pesticid/pesticid.htm
NYS IPM Program: http://www.nysipm.cornell.edu/
NYS Turf and Landscape Association: http://www.nystla.com/
NYSTA: http://www.nysta.org/
NYPIRG: http://www.nypirg.org/
Environmental Advocates: http://www.envadvocates.org/
RISE: http://www.pestfacts.org/
IPM institute website (for school IPM): http://www.ipminstitute.org/

Clippings

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NYSTA Turf and Grounds Exposition Grows!

The annual New York State Turfgrass Conference held November 14-16, 2000 in Syracuse, NY was attended by a record number of participants. The attendees have come to expect high quality education and were not disappointed. Several sessions that addressed pending legislation regarding pesticide reductions, neighbor notification, and organic turf management were filled to capacity. Stephen Smith, two-time Past President of NYSTA received the Associations highest honor, the Distinguished Service Award, for his many years of service and dedication to the turf industry in New York. Planning is already underway for the 2001 Conference; if you'd like to be a part of the excitement, contact NYSTA at (800) 873-8873 or through their website, www.nysta.org.

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Cornell Trains 1500th Short Course Student

The 2001 Cornell Turfgrass Short Course Season helped train our 1500th participant over 14 years. This year the original course was held for one week and an advanced seminar series followed during January in Ithaca. The Advanced Series once again brought speakers from across the country to supplement the expertise of the Cornell Team. Additionally, over 40 professionals attended the 2nd Short Course held in the Hudson Valley in Westchester and Putnam counties. Plans are underway for the 2002 season. If you'd like more information, contact the Director of Turfgrass Education, Joann Gruttadaurio, at (607) 255-1792 or jg17@cornell.edu.

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48-Hour Prior Notification of Commercial Lawn Care Applications

Who does it affect?

- All commercial lawn care operations, in counties that have adopted the law locally.
- Golf courses, sod farms, and cemeteries are EXEMPT.

What applications count?

- Applications of pesticides within 150 ft. of a property with a dwelling.

Some exempt applications

- Granular materials (ground applied, not dusts or powders),
- Minimum risk pesticides and "biopesticides" as determined by NYS DEC on an annual basis,
- Horticultural soaps and oils,
- Applications outside the home intended for indoor pest control. (e.g. termite control),
- Spot applications (ground area of ≤9 ft^2, container of ≤32 oz., manually pressurized or not pressurized),
- Emergency application to protect humans from imminent health threat. In this case, a good faith effort must be made to notify, and paperwork must be subsequently sent to the Commissioner of Health,
- Protection of agricultural products (e.g. home orchard),
- Direct injection of pesticides, and
- Antimicrobials (as defined by FIFRA).

Who gets notified?

- Occupants of 1 or 2 family homes.
- Owners or property managers of multiple occupancy dwellings. They must in turn notify their tenants 24 hours prior to application.

When?

- At least 48 hours prior to application.

What does the notification include?

- This statement must be included, verbatim, in written form:
  "This notice is to inform you of a pending lawn care pesticide application to a neighboring property. You may wish to take precautions to minimize pesticide exposure to yourself, family members, pets or family possessions. Further information about the product or products being applied, including any warnings that appear on the labels of such pesticide or pesticides that are pertinent to the protection of humans, animals or the environment, can be obtained by calling the National Pesticide Telecommunications Network at 1-800-858-7378 or the New York State Department of Health Center for Environmental Health information line at 1-800-458-1158."
- An application date, with two alternative dates in case of weather conflicts.
- Standard information about the location of the application, applicator contact information and the EPA registration number of the pesticide to be used.
- Additional information, such as company advertising may be included.

The provision for counties to opt into most aspects of the law was a compromise forged to help bridge differences in the Assembly and Senate versions of the bill. Proponents of the law feel it is considerably weakened by the provision, whereas opponents see an opportunity to win the battle on a local level.

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Environmental Complacency: What Can We Learn From Rachel Carson and Dr. Seuss?

A Healthy Ecosystem

In the concluding section the authors state, "University research shows that most pesticides used on golf courses have a negligible effect on the environment." This has been the cry of turf managers since the research has been completed.

When Rachel Carson penned the now famous *Silent Spring*, she addressed an aspect of American life wrought with ignorance regarding pesticide use and environmental quality. The outrage stirred by *Silent Spring* provoked the anger created by the "cranberry scare" of 1959. Cranberry growers applied a pesticide during the growing season in defiance of Food and Drug Administration (FDA) restrictions. The pesticide found at low levels in the cranberry supply was suspected of causing cancer. These events had a profound and enduring effect on public consciousness. In many parts of the country, this concern persists today.

The turf industry experienced a similar "Silent Spring" event with publications from the United States government's General Accounting Office in 1988 asking the question, "Are the hazards of lawn care pesticides underestimated?" Then in 1989 the Attorney General of New York published "Toxic Fairways: The Risk of Groundwater Contamination from Golf Courses." Jay Feldman and his organization, National Coalition Against the Misuse of Pesticides (NCAMP), and other activists seized the moment to confront the turf industry.

The initial response from the industry was defensive. The 1992 GCSAA conference held a packed session for thousands for golf course superintendents to hear from Mr. Feldman and officials from the EPA. The following year the GCSAA invited Michael Fumento, author of *Science Under Siege*, who reported the results of topical searches he conducted on golf courses and cancer. "Golf courses fight cancer, as professional tournaments raise funds," Fumento proclaimed the results of his search. The crowd erupted and you could sense that the golf superintendents wanted this crisis over. Still, information was lacking regarding the fate of pesticides and nutrients applied to turf.

The United States Golf Association embarked on an important research initiative to more thoroughly understand the influence of turf management on environmental quality. The environment under investigation was air and water quality. Concurrently, Ron Dodson was introducing a program to the turf industry that assisted with environmental management. Ron was also the driving force behind the Wildlife Links Research Program that investigated the influence of golf turf management on wildlife. The research information was on its way, and now there would be a mechanism for implementation.

Environmental Evolution

The USGA held a symposium at a 1998 meeting of the American Chemical Society to discuss the decade of USGA-funded environmental research. As a member of the Research Committee at the time, I had a unique experience hearing from the leading researchers in our field and then to have their work in a Symposium Book published in 2000. The opening chapter, authored by Mike Kenna and Jim Snow, provides an excellent overview of the research. In the concluding section they state, "University research shows that most pesticides used on golf courses have a negligible effect on the environment." This has been the cry of turf managers since the research has been completed.

Audubon International programs for new and existing golf courses have grown over the last decade, but still represent about 10% of all courses in the US. In fact the number of fully certified courses is well below 5% of all courses. Most courses are either not involved or if they have paid the entry fee of $100, have not actively pursued full certification. Yet, in many states, the Audubon programs are actively embraced by government agencies as a means of insuring environmental quality when a new facility is proposed.

Many golf courses throughout the country continue to face public opposition to pesticide and fertilizer use. Several communities in California have banned the use of most pesticides and this trend is actively underway in NY (see feature article by Jennifer Grant beginning on page 1). The turfgrass industry has responded by mounting significant lobbying efforts to combat the legislative agenda of advocacy organizations. At the same time, the industry faces

new pest problems such as bentgrass deadspot and gray leafspot that require substantial pesticide inputs to maintain expected quality.

Another Level

Millions of dollars have been invested to research the environmental fate of applied chemicals. These studies attempt to determine the role that specific management practices may play in minimizing off-site movement and often use EPA concentrations to evaluate success. In general, these levels are established from toxicological research that determines concentrations that might cause human health concerns. But what if the levels we have been using were harmful to other species vital to aquatic ecosystems?

Environmental researchers from Canada published an assessment of nitrogen pollution influence on amphibians in a 1999 issue of *Environmental Health Perspectives.* The paper is a review of available water quality information for the Great Lakes region of the US and Canada. Of the over 8,000 water quality samples collected in areas surrounding the Great Lakes, 20% of them were found to have concentrations that cause sublethal effects in amphibians. Nitrate levels as low as 2.5 parts per million have been shown to affect amphibians.

The nitrate in the water appears to disturb the digestive process in tadpoles in a way similar to the mechanism in humans. The nitrate is converted by the bacteria in the infant's gut and then severely restricts the blood's ability to become oxygenated. There is a significant lack of information available on the toxicity levels relative to the different amphibian species, including influence on the predators and prey.

The review did not point the finger at the turfgrass industry, but rather to understand the influence of wastewater treatment, livestock, precipitation, and fertilizers on nitrate pollution. Clearly, as major users of fertilizers for turfgrass areas such as golf courses, we must be aware of best management practices to minimize off site movement. In addition, turf is an important vegetative buffer and biofiltration system to protect sensitive aquatic habitats. Now is the time to think about this bigger picture before another crisis occurs.

The Lorax

Kenna and Snow end the chapter in the ACS Symposium Book, "The USGA, and the game of golf, need to keep asking questions and looking for new ways to maintain golf course grasses. More important, efforts should be increased to educate the golfer about environmental issues." The importance of these points cannot be overstated, yet I am regularly amazed at how many in our industry feel that the environmental crisis is over. I sense a complacency among organizations and industry leadership that image, labor issues, and expected turf quality are greater challenges, since they know the results of the USGA studies.

Theodor Geisel, known more commonly as Dr. Seuss, wrote a book in the early 1970's titled *The Lorax.* The story is about a once-ler who makes "Thneeds that everyone needs," and cuts down every "Truffula tree" to make the Thneeds against the warnings of the Lorax. Little by little the once-ler argues that Lorax worries too much, there are plenty of Truffula trees, and that people need Thneeds! Until all the creatures that use the trees are gone, the water is polluted, and the last Truffula tree is cut down. This book was a loud cry to young people to look beyond what they need today and as Seuss states, "Unless someone cares a whole awful lot, nothing is going to get better."

There is nothing more important to the well-being of the turf industry than environmental quality. Yes, the data is encouraging that as far as we can measure, there appears to be little negative influence, yet as we continue to ask questions we find new answers. At the same time, we need to look at turf management. Should we plant ryegrasses where gray leaf spot is going to be a problem? Can we justify intense pesticide use for new pest problems? Are we creating these problems from the conditions we create? Why do the golfers appear no more involved than they were a decade ago? Why isn't every course in the Audubon program?

As the human population grows, the concern for environmental quality will be even greater. As an industry, we cannot rest on our laurels, we must be vigilant in our efforts to inform golfers about the price of what they are demanding. In some cases, we may not know exactly, but shouldn't we err on the side of caution? The amphibian study is only one aspect of what we are a part of, as Carson states in *Silent Spring:* "the fabric of life, on one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways."

Frank S. Rossi

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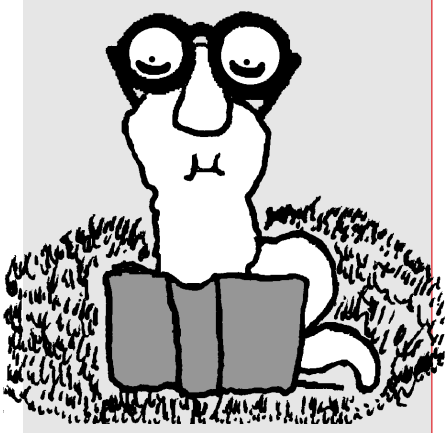
Brought to You in Living Color

The Lawn Reader

The book also includes a very useful collection of appendices of herbicide information. An exhaustive list of herbicide effectiveness and safety on the major turfgrasses in North America is the backbone of the appendix.

The Color Atlas is a useful weed identification and control reference that will need to be supplemented with state recommendations for legality of certain chemicals.



Color Atlas of Turfgrass Weeds
L.B. McCarty, J.W. Everest, D.W. Hall, T.R. Murphy, F. Yelverton
Ann Arbor Press, Chelsea, MI
ISBN 1-57504-142-1

This eclectic collection of weed scientists from the southeastern United States have created an important weed identification and control reference for turfgrass managers. This publication rounds out the pest management installments in the Ann Arbor Press Turfgrass Science and Practice series that includes *Destructive Turfgrass Insects* and *Color Atlas of Turfgrass Disease.*

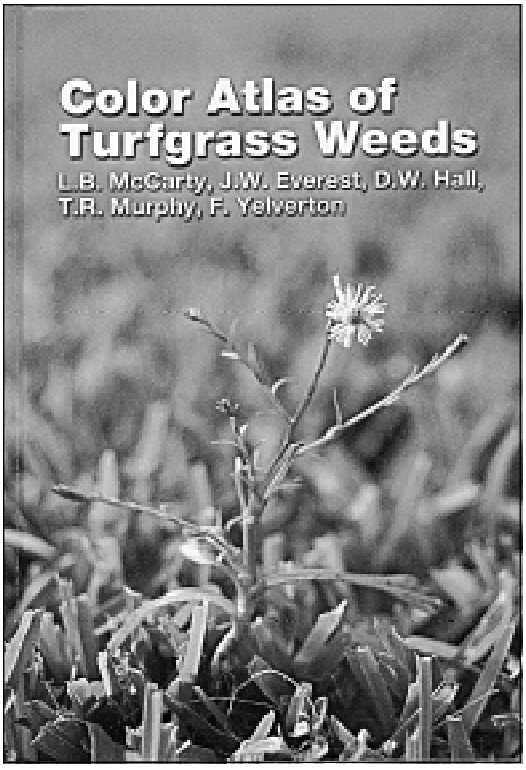
An extremely brief, yet useful introduction to weeds and weed control precedes the opening identification chapter on grass and grass-like weeds, followed by a collection of broadleaf weeds. This book is intended to serve as a comprehensive collection of weeds in turf in North America and consequently is filled with many species not found in the northeast. In addition, the major weakness of the identification section is the lack of seedling photographs. This type of photograph would enable the turfgrass manager to be more proactive in making positive identification.

The book also includes a very useful collection of appendices of herbicide information. An exhaustive list of herbicide effectiveness and safety on the major turfgrasses in North America is the backbone of the appendix. In addition, common and trade names of herbicides are also useful, especially for the multitude of combinations on the market. The book closes with a glossary of taxonomic terms that will be referenced in the identification section of the text.

The Color Atlas is a useful weed identification and control reference that will need to be supplemented with state recommendations for legality of certain chemicals. In addition, the lack of seedling weeds—and specifically northeast conditions—will not replace the need for *Weeds of the Northeast,* by Uva et al. (1997).

As always, reader suggestions of books to include in this column in future issues are welcome.

Frank S. Rossi



Zeolite Use in Sand-Based Systems

An experiment was conducted to evaluate the usefulness of two ZeoponiX zeolite treatments as amendments of sand-based golf greens. The site for the study was the Cornell University Turfgrass Field Research Facility in Ithaca, NY.

Three replicate plots of each of the two ZeoponiX treatments were arranged in a completely random design. Plots consisted of 2 m dia. by 45 cm deep plastic containers (swimming pools) fitted with a drain to collect leachate.

The soil profile consisted of 15 cm of gravel at the base and 30 cm of Zeopro-sand root zone material. The mixing was done in a cement mixer on June 2, 1998 and stockpiled under cover until the pools were filled on June 4, 1998. The plots were covered with tarps until seeding. The site was seeded with creeping bentgrass (at a rate of 1 lb. seed/1,000 sq.ft. with Penncross and L-93) on June 18, 1998.

Fertilizers were applied starting on July 20, 1998 with ammonium sulfate as the N source and potassium sulfate for K applied at a rate of 1 lb. N/1,000 sq. ft of N and K_2O. Fertilizer was applied in a hand held shaker on August 3,17, 31 and September 14 and 28. To facilitate rapid establishment, the plots were irrigated for 5 minutes each hour from 6 am to 6 pm until plot cover reached 100% (July 31, 1998) at which time a more moderate irrigation schedule was followed (about 50% of the above amount).

Clippings were harvested for yield and nutrient recovery (N, K, P, etc.) Clippings were sampled by taking one pass of a Toro walking greens mower set at 0.25 inch height. Mowing was done on an as needed basis and clippings were dried at 60° C for at least 24 hours prior to weighing and combined for the periods listed above. The clippings were analyzed for nutrient content at the Cornell Nutrient Analysis Laboratory for total N , K and P.

Leachate was collected daily or as needed. The volume was recorded and a subsample was saved and refrigerated. A weekly combined sample was made taking a proportional amount of the daily subsamples. All weekly samples were analyzed by the Cornell Nutrient Analysis Laboratory for NO_3-N, NH_4-N and K.

Visual quality was recorded using a scale of 1 to 9, where 1 is bare soil, 6 acceptable turf and 9 ideal turf. The establishment rate was visually estimated on the same dates as the visual quality determination. Soil samples were collected for soil moisture release characteristics and CEC.

Nutrient Leaching

In general, there were no differences in the volume of leachate between treatments except for week 1 where the half-fertilizer rate Zeopro plots had higher leachate volume than the other treatments. Except for the first two weeks, there were no treatment differences in K or NH_4 leaching. During the first two weeks both Zeopro treatments had slightly higher amounts of K and NH_4 leaching which is not surprising since K and NH_4 were not applied to the control (sand/peat) plots until week 4.

Nitrate leaching was influenced by the addition of Zeopro to the sand. Especially early in the study, the amount of NO_3 leached was significantly higher than from the sand/peat control plots. From week 9 forward there were no differences in NO_3 leaching. Averaged over the entire study, the amount of NO_3 leached was significantly higher than the sand/peat control plots. The higher leaching may be due to two reasons. First, N was not applied to the control plots until week 4, where the Zeopro plots had N preloaded. Second, it appears that the amount of N preloaded on the zeolite may be more than the turfgrass plants could use and therefore, the excess N was likely to be leached (see Table 1).

Visual Quality and Turf Density

Zeopro dramatically improved quality (density, color and uniformity) as compared to the standard root zone material of sand/peat. From 29 to 43 days after seeding (DAS), the Zeopro plots had an average of 3 quality units higher than the sand/peat plots.

continued on page 12

Program Spotlight

An experiment was conducted to evaluate the usefulness of two ZeoponiX zeolite treatments as amendments of sand-based golf greens.

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CUTT

Zeolite Influences

continued from page 11

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From 29 to 43 DAS, the turf density of the Zeopro plots were 2 to 4 times higher than the sand/peat plots. This rapid rate of establishment has not been observed in other experiments we have conducted.

The turf density on Zeopro amended sand plots doubled from 18 to 29 DAS, whereas, the turf density of sand/peat control plots only increased slightly during that time frame. From 29 to 43 DAS, the turf density of the Zeopro plots were 2 to 4 times higher than the sand/peat plots. This rapid rate of establishment has not been observed in other experiments we have conducted. The overall average visual quality and turf density was enhanced with the addition of Zeopro fertilized at either rate (see Table 2).

Root Length

Roots can be measured by mass or length. Root length often is a better indicator of turfgrass health and growth recovery than biomass. The addition of Zeopro to sand fertilized at either rate had twice the depth of roots at the end of the study in November 1998. This indicated that the Zeopro provided a better environment for root development, which may be related to the phosphorus effect on rooting (see Table 3).

Summary

The addition of Zeopro to sand improved the establishment rate of creeping bentgrass, visual quality, CEC, moisture holding capacity, and rooting depth compared to the standard root zone amendment peat. There was little difference in response between full and half rate fertilization programs with Zeopro. However, there was more nitrate leaching from Zeopro-amended plots than from the sand/peat plots. This indicates that there was more N in the system than the turfgrass plants could use or that could be stored on the Zeopro exchange sites. Therefore, it may be necessary to use less Zeopro in the mix or only modify a smaller portion of the root zone (less than 12 inches) or pre-load less N on the CEC sites to reduce the potential for nitrate leaching.

A. Martin Petrovic

Table 1. Average leachate volume and nutrient mass leached for each treatment over all 10 collection periods.

Treatment	Leachate volume	Nutrient mass leached		
		K	NO_3-N	NH_4-N
	---------- l ----------	---------- g ----------		
Sand/peat	355 a	0.897 a	2.05 a	0.00 a
Zeopro (full rate)	316 a	1.56 a	14.1 b	0.096 a
Zeopro (half rate)	219 a	2.04 a	11.4 b	0.00 a

**Note: Values followed by the same letter are not significantly different; values followed by a different letter are significantly different.*

Table 2. Turf density and visual quality mean comparisons over time intervals.

Treatment	Visual quality	Turf density
	Scale of 1-9	%
Sand/peat	2 a	31 a
Zeopro/full rate	5 b	81 b
Zeopro/half rate	5 b	75 b

**Note: Values followed by the same letter are not significantly different; values followed by a different letter are significantly different.*

Evaluation of Potential Allelopathic Effects of Fine Fescue (*Festuca rubra*) Accessions on Turf Weeds

A two year study was conducted in Ithaca NY to evaluate fine fescues (red and chewings) which were observed to inhibit germination and establishment of common annual and perennial weeds in turf.

Eighty fescue accessions were evaluated in the field under low to moderate mowing heights for their weed suppressive abilities and suitability as turfgrass. Over two growing seasons, five fescue accessions consistently provided excellent suppression of common turf weeds when established at similar planting densities while other accessions provided moderate to little weed suppression.

Laboratory studies were conducted to evaluate potential allelopathic interference of selected fine fescues. Fescues were established for 14 days before introduction of weed seeds in gel or sand bioassay systems. Curly cress and large crabgrass growth was strongly reduced with certain accessions which apparently produced bioactive root exudates. Using a capillary mat system to produce large quantities of root biomass, root exudates were collected from fescue accessions of interest.

The production of root exudate varies with accession; certain accessions corresponding to those most suppressive in field conditions also produced exudates exhibiting strong inhibition of seed germination. HPLC, TLC and MS techniques are currently being utilized to determine the chemical nature of the bioherbicides in active root exudates.

Cecile Bertin, Leslie A. Weston and Frank. S. Rossi

Table 3. Mean root length comparison.

Treatment	Root Length (cm)
Sand/peat	12.1 a
Zeopro/full rate	24.0 b
Zeopro/half rate	24.8 b

**Note: Values followed by the same letter are not significantly different; values followed by a different letter are significantly different.*

It may be necessary to use less Zeopro in the mix or only modify a smaller portion of the root zone (less than 12 inches) or pre-load less N on the CEC sites to reduce the potential for nitrate leaching.

Program Spotlight

Over two growing seasons, five fescue accessions consistently provided excellent suppression of common turf weeds when established at similar planting densities while other accessions provided moderate to little weed suppression.

CORNELL Turfgrass
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Short CUTT

April 5, 2001
Week 2

Weather Highlights

- **Temperatures:** Cold this past week. Temps were 4° to 5.5° ↓for most of the region, 6° to 7° ↓ to the south and warmest to the west, 2° to 4° ↓.
- **GDD:** None accumulated this past week. This time of year NYC south would see 30 to 40 and points north should have accumulated ~ 10 to 20.
- **Precipitation:** Abundant across the region. 1" to 2" for most of us. Driest to the west < 0.25", 0.5" across central PA and the highest amounts NYC area with 3".
- **ET:** 0.25" for the region. ET at this time of year can be critical when annual bluegrass suffers winter injury and lower plant crown damage that inhibits early spring rooting.
- **Soil Temperatures:** 36° at 2" in Geneva, 40° at 2" Philly and mid 40°'s as you move west.
- **Forecast for the Coming Week:** Expect a change in the weather pattern bringing ↑ normal temps. (2° to 5°). Weekend will bring a warm front to the northeast. South of the front temps will be in the 60°'s and north of the front 50°'s. Rainfall expected Friday thru Monday particularly to the north of NY and drier to the south. Precip will be ~ 0.5" to 0.75".

Around the Region

- **LI:** Wet with 3" of rainfall. Grass is starting too green-up.
- **Hudson Valley:** Snow molds and salt damage along roadways.
- **Western NY:** Snow molds
- **Jennifer Grant:** Right of Way conference update: Dept. of Transportation is doing some interesting work on alternative weed control including mowers and mats. Demo plots are located around the state. Contact Jennifer for more info.

Grazing in the Grass with Frank Rossi

Turf Covers: In the last decade a few studies have investigated the use of covers to prevent winter injury, with the most comprehensive being conducted in Canada. Several types of covers were used that included completely impermeable blankets, curled wood shavings mat, straw mulch covered with impermeable material, felt material, and a wood frame that created a 2 inch air space above the green and covered with an impermeable material. An uncovered treatment was included to determine the influence of snow or ice cover on winter injury.

Deep prolonged snow cover at the Quebec City location on the uncovered plots afforded the warmest soil temperature and provided best protection from winter injury. However, there were some problems noted from severe snow mold damage. These snow mold scars on putting greens with the new generation bentgrasses can persist for months into the growing season. Results from the Montreal site demonstrated substantial differences in soil temperatures, explanations of how plants are injured and variable survival depending on the type of cover. Temperatures as low as -10° F were recorded under the felt material, and consequently considerable winter damage was observed. In fact, a subsequent study suggested that anoxic conditions, where oxygen levels decrease and carbon dioxide levels increase, might be responsible for severe winter injury to annual bluegrass if experienced for more than 40 days. The researchers went on to suggest that anoxic conditions are exacerbated when soil respiration is high, a condition noted with high organic matter soils.

Uncovered plots reached as low as -17° F. Insulating covers like straw, curled wood mat and the 2 inch air space reduced temperature fluctuations at the soil surface and the annual bluegrass overwintered successfully. Spring removal of covers should be dictated by temperature and leaving them on longer may lead to more rapid green-up. This green-up could result in increased injury, so moving covers on and off in the spring may be required to avoid freezing the succulent tissue. There are some anecdotal reports that indicate that while covered greens do grow sooner, if they are not protected in the early spring from frost, the greens will get set back and be delayed in their performance.

Fungicide Injury: Pentochloronitrobenzene (PCNB) is a uniquely persistent soil active fungicide that affords the winter long disease protection. However, there have been an increasing number of reports regarding turf injury relate to PCNB. Researchers at Penn State University led by Peter Landschoot investigated two formulations (liquid and granular) of PCNB, applied at half, full and double rate (to simulate application overlap) and three timings (late fall, winter and spring). The most objectionable injury was noted after the late and spring applications of the liquid product. The spring application is not available to the superintendent based on label restrictions. Injury from applications of the granular formulation did not appear until after three years of treatments, especially in the final year of the study with follow-up spring applications. The persistence of PCNB was noted with enhanced dollar spot control. Winter and spring applications of PCNB provided up to five months of dollar spot control, regardless of formulation. Finally, Dr. Landschoot and his colleagues observed significant annual bluegrass encroachment in some of the PCNB treated plots in the final years of the study. It was suggested that PCNB reduces the competitiveness of bentgrass or possible enhances annual bluegrass.

Preemergence Herbicides and Rooting: Preemergence herbicides do not inhibit germination, in fact they require weed germination to be effective. Following germination the seedling absorbs the herbicide which is resident in the top 2" of soil. The majority of preemergence herbicides (pendimethalin, benefin, trifluralin, oryzalin, bensulide, prodiamine, DCPA, napropamide, dithiopyr) act by inhibiting cell division which eventually exhausts the seed reserves before the weed can emerge and begin photosynthesizing. The effect of preemergence herbicides on rooting has focused on establishing Kentucky bluegrass sod. In general, preemergence herbicides are thought to be less injurious to established turf, though, the ability to detect subtle differences in rooting remains a critical void in turfgrass research. Grass root tips are regions of active cell division (meristems). The root meristems could be affected if it contacts a preemergence herbicide that inhibits cell division. Ecologically, turfgrass rooting will be most active in the early spring when the soil is cool and top growth is yet to be initiated. This root development aids the turf's ability to withstand summer stress periods where evaporative demand is high and

emergence
during a
application
active stage
would avoid injuring the new roots. Yet, if crabgrass has already emerged most preemergence products will not provide postemergence control, hence, proper timing remains critical.

Our Guest: Dr. Gail Schumann, Dept. of Plant Pathology, U. Mass.

- **Grey Snow Mold:** The prolonged snow cover has made this a good year for snow molds. Under long snow cover we tend to see more Grey snow mold (*Typhula incarnata*) but the good news is that for the most part Grey snow mold eats the leaf blades and does not damage the crown. Once the snow melts the *T. incarnata* activity ceases. Best option is to rake off the matted surface and let the turf recover. Avoid excess nitrogen.
- **Pink Snow Mold:** Pink snow mold (*Michrodochium nivale*) will persist as long as the weather is cool and wet. It does not require snow cover. This fungus will get into the crown, unlike the Grey snow mold, and can appear greasy like Pythium and be difficult to distinguish. This pathogen can be problematic when you start to mow and walk on diseased areas spreading the spores. If this is an issue rope off area to avoiding spreading. This is the time to avoid excess nitrogen and divert water that will move the spores. Pink snow mold is primarily a problem for GC's that need to get out and get going early in the season. Usually homelawns and athletic fields aren't seriously effected. Spring treatments are not recommended. Occasionally a fall treatment may be necessary for a newly established lawn or field (fall) that will have weak reserves to come out of winter.
- **Anthracnose:** Early sightings of Anthracnose (*Colletotrichum graminicola*) on Poa and Bent may be the resting structures from last fall. There was a lot of crown rot last year from the wet, cool summer and stressed poa. It is hard to believe the pathogen is actively growing in these soil and air temps. Anthracnose is typically associated with summer temps (>70°) and stress. Now is not the time to treat the turf. Once you see the blackened crown its too late for fungicides. Granular materials are not effective for crown rots.
- **Leaf Spots:** Reports of Red Leaf Spot (hot weather disease) this time of year are usually a result of winter stress and nutrient issues not the pathogen (Ophiosphacrella). We can expect Drechslera and Bipolaris as soon as it turns warm and wet especially areas that were fertilized. Fungi grow when the grass grows with the exception of snow molds.

Take Home

- **Avoid making applications when the turf is dormant**. If you're going to treat…make sure the grass is growing and you are mowing. Fungi grow when the grass grows.

Turfgrass ShortCUTT

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three page format. Originally, we received some grant money to get the project going, but now as the grant funds are expiring, we are offering annual subscriptions for the turf industry. Currently, our pricing is $75 per year via email, $100 per year via FAX. NYSTA members enjoy a 10% discount.

As an added bonus, we compile and index all 32 to 35 weeks of *ShortCUTT* for easy reference into an Almanac that serves as a diary of the growing season. The Almanac also includes a complete set of weather charts and graphs to compare current conditions with historical information. It is also useful during the current growing season to refer back to information to compare management strategies. The Almanac has a $50 value.

For a limited time, we are offering a year of emailed *ShortCUTT* plus the Almanac for $100 ($125 for FAX delivery)—a 50% savings on the price of the Almanac—if we receive your subscription form by May 30, 2001. Again, NYSTA members receive a 10% discount. So, now is the time to take advantage of this exciting and innovative approach to having the latest research-based information at your fingertips during the growing season. Act now, send in the subscription form with your payment to secure the Almanac and begin receiving the weekly *ShortCUTT*.

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CUTT

Turfgrass ShortCUTT: Easy to Use Research-Based Information

New Resource

ShortCUTT *is a weekly newsletter delivered each Monday during the growing season via email or fax.* ShortCUTT *includes comprehensive weather information, a weekly forecast, pest observations from turf educators throughout the Northeast, and cultural and pest management recommendations based on the latest research.*

As we reflect on another growing season in the books we are mindful of the challenges the turf industry faced with excess moisture, new diseases (bentgrass dead spot, gray leafspot, etc.) and the ever-present environmental debate. In each case, the most efficient means of dealing with these issues begins and ends with information and experience. It seems to me that each year there is more new information than we can keep up with. Yet, day in and day out, we have to make informed decisions as maintenance standards increase and the margin for error gets razor thin.

The Cornell Turfgrass Team has established a long tradition of conducting important fundamental scientific research focused on turfgrass management. We have scientists who are recognized as *the* experts in their field. This includes biological control, soil insect management, turfgrass ecology, and environmental quality. Still, much of this information is not effectively transferred to you, the end-user, in a form that makes it easy to implement. Interestingly, our Turfgrass Program is not unique in this sense. It seems an almost insurmountable task to communicate the information in a way that makes sense to the golf turf industry.

In the last few years we have committed significant resources to addressing this information transfer need. Specifically, in 1998 we initiated the Turfgrass Hotline, now known as *Turfgrass ShortCUTT* (CUTT=Cornell University Turfgrass Times). *ShortCUTT* is a brief, concise, weekly newsletter delivered by noon each Monday during the growing season via electronic mail or FAX. A recent sample issue is reproduced on page 14.

ShortCUTT includes comprehensive regional weather information, including a weekly forecast; regional pest observations available from turf educators throughout the northeast, including USGA NE Regional Agronomists; cultural and pest management recommendations based not only on current weather patterns, but also on the latest research available from around the world; and finally, each week a national expert is interviewed on a relevant topic such as nematodes, cutworms, bentgrass deadspot, annual bluegrass decline, etc. Guests have included Pat Vittum, Paul Vincelli, Bruce Clarke, and other key researchers. In fact, our subscribers in 2000 were the first to know when gray leaf spot was diagnosed and the first to learn of the best strategy for bentgrass deadspot control. They were armed with the latest, most pertinent information on dealing with excess rainfall and intense dollar spot.

In an effort to get this research-based information into your hands when you can most easily use it, without taking your valuable time, we utilize electronic delivery via email or FAX and synthesize the information into a two or

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