CORNELL UNIVERSITY TURFGRASS TIMES

CUTT

2006 Issue 2 • Volume 17 • Number 2

Festuca:

Versatile, Weed-Suppressive Turfgrasses for Diverse Settings

The presence of a high quality turfgrass in a landscape influences our lives visually, functionally and recreationally. In the United States, there are currently more than 30 million acres of turfgrass including lawns, parks, golf courses, sod farms, industrial and institutional grounds, and highway rights-of way. In New York State alone, over 3.4 million acres have been established in turfgrass (NY State Turfgrass Survey, 2004), and over 18,000 miles of major highways. In all turf settings — especially lawn and roadside turf — weeds are a key pest problem.

A substantial pesticide market (over $2 billion dollars) currently exists for control of weeds, insects and diseases in private and commercial turfgrass settings. Although herbicides continue to be the predominant form of weed management in commercial turf settings, herbicide use in public and private landscapes is increasingly challenged by environmental and health concerns. Consequently, turfgrass managers, including homeowners, are seeking alternative weed management tools.

One preventive strategy to minimize weed infestation is the use of appropriate turf mixtures or cultivars that are well adapted to a given setting for optimal density and growth. Weeds are much less likely to invade a well-managed turf in good condition, maintained with appropriate cultural practices including timely mowing, fertilization and irrigation. In recent years, our research has focused on the selection and utilization of fine leaf fescues as low maintenance, stress tolerant and weed suppressive turfgrasses in landscape and roadside settings.

The genus *Festuca* or fescue represents one of the largest groups of grasses in the tribe *Poaceae*. Approximately 100 different fescue species are currently found in the United States and Europe. If one looks closely at a collection of fescues, it is easy to see that *Festuca* species vary greatly in morphology, cytology and growth habit. Generally, the fescues are divided by appearance and usage patterns into two specific types: fine or coarse leaf fescues.

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This Times

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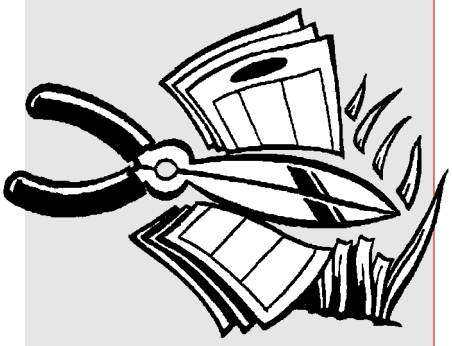
CUTT

Clippings

If you haven't seen the "new" weekly ShortCUTT *newsletter from Cornell University, sponsored by NYSTA, you are really missing some valuable information.*

Don't miss another issue — especially if you are a member of NYSTA. Just supply the NYSTA office with your email address and you are on your way!



Don't Miss an Issue of *ShortCUTT*

If you haven't seen the "new" weekly *ShortCUTT* newsletter from Cornell University, sponsored by NYSTA, you are really missing some valuable information. There is no excuse for not receiving it if you are a member of NYSTA since it is an important member benefit. And now with access to pest predictions through the "ForeCast" website developed with the Northeast Climate Center, you can see ideal times for pest management and irrigation needs.

The newsletter format offers an easy to read update on the latest research from the world of turf, as well as regional observations and regular updates from the USGA and the Rutgers Disease Diagnostic Laboratory. It is designed to fit into your busy professional life, providing everything you need to know about golf, sports and lawn turf in two pages.

Don't miss another issue — especially if you are a member of NYSTA. Just supply the NYSTA office with your email address and you are on your way! For nonmembers of NYSTA, subscriptions are available for $150 per year at www.hort.cornell.edu/turf. This is more than twice what a NYSTA membership would cost you so it is a much better deal to join NYSTA and get the latest information.

Pat Blum Does it Again...for his kids!

Pat Blum, golf course superintendent of Colonial Acres Golf Course in Glenmont, NY, is no stranger to environmental awards. In 2004 he was awarded the Governor's Award of Excellence for Pollution Prevention, marking the first time a golf course was honored in the history of this award. He has also received GCSAA/Golf Digest Environmental Leader in Golf Awards as well as regular mention from Audubon International for being a leader in their Cooperative Sanctuary Program.

Pat was awarded the 2005 Excellence in Government Relations Award from the GCSAA for his continued work to educate government officials and community leaders on the environmental compatibility of golf. In receiving the award Pat once again paid homage to his family, especially his father, for teaching him well. However, what is so moving about Pat is his unending devotion to his children and how they remain his motivation for keeping Colonial Acres among the most environmentally compatible properties in the US.


Cornell Turfgrass ShortCUTT

Weather & Past Predictions

Send Us A Letter

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

The Water's Edge

Many turfgrass areas border water features, whether they are golf course fairways or lakeside home lawns. This often raises concern over the potential influence of turfgrass on water quality and the runoff of fertilizers and pesticides. Therefore, it behooves the turfgrass manager to be mindful of management practices implemented on these critical buffer areas that border surface water bodies to minimize runoff.

Research has been underway at Oklahoma State University for the last ten years on Bermudagrass buffer strip size and management. Recently the research has focused on the effect of consistent versus graduated mowing heights within a buffer strip. This study evaluated a buffer strip mowed consistently at 2" versus mowing the strip at 1", 1.5" and 2" within the same strip creating a mowing gradient within the plot.

Runoff amounts and fertilizer runoff were evaluated under natural rainfall and irrigation events. The graduated mowing regime reduced overall runoff water volume over 15 percent and nitrogen and phosphorus losses by as much as 20 percent compared to the single mowing height of 2". Furthermore the time when runoff occurred was extended by 4 hours on the graduated mowing plots compared to the single mowing height.

In general, 2 percent of the applied nitrogen and 6 percent of the applied phosphorus were lost to irrigation just four hours after fertilization regardless of management. This was determined to be sufficient to cause unacceptable nutrient loading of surface water bodies. Therefore, any effort that reduces runoff amount, even by a small percentage can have a dramatic effect on the nutrient movement from turf adjacent to water features.

While this work was conducted on Bermudagrass there are clear lessons for cool season turf. The ability of various turf heights to slow runoff from occurring and reducing overall volume is worthy of implementation rather than mowing the buffer strip at a single mowing height right to the water's edge.

From: *Moss, J.Q., G.E. Bell, M.A. Kizer, M.E. Payton, H. Zhang, and D.L. Martin. 2006. Reducing nutrient runoff from golf course fairways using grass buffers of multiple heights. Crop Sci. 46:72-80.*

K and Soil Testing

Potassium is an important macronutrient that is typically applied in the greatest amount after nitrogen. While the recommended method for determining potassium need is by soil testing, many turfgrass managers simply assume it is needed and will apply it in similar amounts to nitrogen. Clearly we need to more fully understand if potassium is in fact required to be applied at these rates and it seems getting better soil testing methods for potassium would be a logical first step.

Research at Cornell University has been investigating the use of potassium, especially striving to improve the efficiency of potassium use. The first of several experiments focused on assessing the ability of soil testing methods for detecting differences in potassium levels and if soil potassium levels provide evidence of changes in tissue potassium levels in case of deficiency.

A mixed stand of creeping bentgrass and annual bluegrass putting green turf was grown on a calcareous sand, pH 8.2 and treated with 0, 5, 10 and 20 pounds of potassium per 1000 square feet for three years. The plots all received about 3.5 pounds of nitrogen per 1000 square feet. We evaluated five soil extraction methods and found each method was able to detect differences in soil potassium levels albeit to different degrees. In addition, we found that maximum tissue potassium levels were reached at soil test values well below what would be considered adequate to maintain healthy turf. This suggests that soil test interpretation may be overestimating need and that soil tests do not correlate with tissue levels in a way that would help identify deficiencies.

Our research has consistently shown that there is much to learn (or relearn) about potassium management. Having precise soil testing methods would be a good first step but it appears that while we can detect differences, there is much work to do regarding whether an application of potassium fertilizer is needed. We believe that the published N:K ratios of 1:0.5 or 1:0.25 is likely adequate to maintain high quality turf.

From: *Woods, M.S., Q.M. Ketterings, and F.S. Rossi. 2004. Effectiveness of standard soil tests for assessing potassium availability in sand rootzones. Soil Science 170:110-119.*

CUTT

Scanning the Journals

A buffer strip mowed consistently at 2" versus mowing at 1", 1.5" and 2" within the same strip created a mowing gradient within the plot. The graduated regime reduced runoff water volume over 15% and nitrogen and phosphorus losses by 20% compared to single mowing height of 2".

Soil test interpretation may overestimate need; soil tests do not correlate with tissue levels in a way that would help identify deficiencies.

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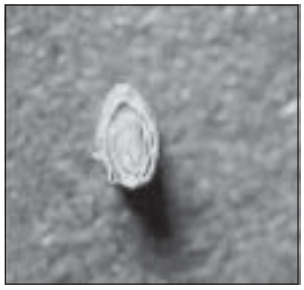
Fine Leaf Fescue

Fine leaf fescues are among the most common turfgrass species currently used in the Northeastern and Northcentral US and Europe for lawns and turf, especially in shaded areas or those with poor soils. The fine leaf fescues include slender and strong creeping red (*F. rubra* L.ssp. *rubra* and *F. rubra* L. ssp. *trichophylla* Gaud. or ssp. *littoralis* [Meyer] Auquiz), chewings fescues (*F. rubra* L. ssp. *commutata* Gaud.), hard fescues (*F. longifolia* Thuill.) and sheep fescues (*F. ovina* L.). These six cool season fine fescue species are commonly used not only as turfgrasses but also for forage, turf or conservation purposes.

The turf-type fine fescues — specifically red, chewings and hard fescues — have been recently selected for improved disease and heat resistance, as well as color and ease of establishment. These grasses prefer to be established in well-drained soils, and are tolerant of both full sun and shaded conditions. They prefer a non-alkaline soil, or lower soil pH. In general, the fine fescues require only limited fertilization and irrigation. The root systems tend to be shallow, and in heat and drought conditions of late summer, the fine fescues often go dormant and turn brown.



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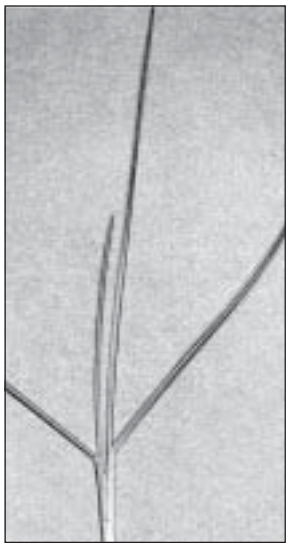
Coarse Fescues

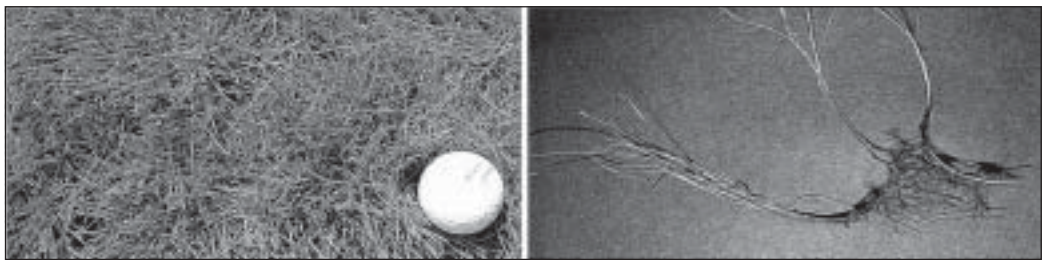
In contrast, coarse fescues or tall fescues (*Festuca arundinacea*) are relatively coarse-leaved, darker green grasses that are drought resistant and somewhat shade tolerant in more southern locations. They are well-adapted to heavy clay soils and perform well in the transition zone states with hot summers and cold winters. Endophyte-free tall fescues are used extensively as forage grasses in pastures and rangelands throughout the US. Other improved turf cultivars are utilized on roadsides and also more recently as attractive turfgrasses in transition zone areas.



The turf-type tall fescues were selected and extensively bred to improve heat and drought tolerance and to have narrower leaves than the pasture-type such as Kentucky-31. Although tall fescue has short rhizomes, it has a limited capacity to spread given its bunch-like growth habit, and can thin in the shade. Reseeding on a regular basis may be needed to retain desired density over time.

Compared to fine fescues, the leaf blades of coarse fescue are relatively tough and require a sharp blade while mowing to prevent ragged edges. It is recommended to mow tall fescue at a height of 3 inches to avoid scalping and maintain density, while fine fescue can be successfully mowed at a lower height. Like fine fescue, tall fescue tolerates periods of drought, but in high temperatures, tends to go dormant. Both fine and coarse fescues are susceptible to several diseases which may be enhanced by exposure to excessive irrigation and fertilization. Fine fescues are susceptible to red thread and dollar spot, while tall fescue is susceptible to brown patch and fescue leaf spot.

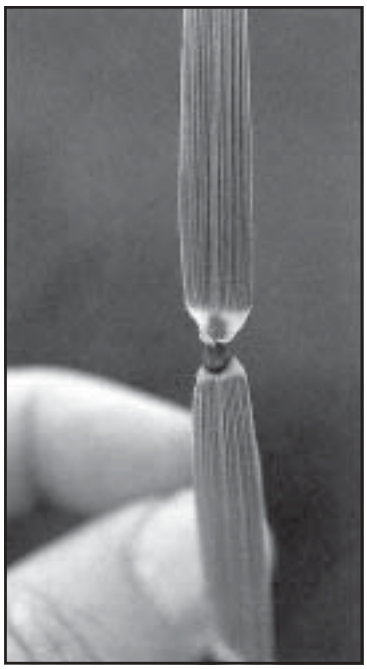
Top: top of a fine fescue plant. Middle: leaf bud vernation of fine fescue. Bottom: turf habit and vegetative growth characteristics of fine fescue.



New & Improved!

Recently, fescue breeders have developed genetically improved cultivars that possess tolerance not only to acidic soils and those with low fertility, but also to a variety of sun exposures including substantial shade as well as full sun conditions. Although fescues are often slower to germinate and establish than other turfgrasses such as perennial ryegrass, newer cultivars have been selected for more rapid establishment and green-up.

Currently, there is increased interest by the US and European turfgrass industries in the utilization of fine leaf fescues for both lawn and golf turf as well as for low maintenance settings with exposure to stressful conditions, including cold temperatures, drought and saline soil conditions or roadside salt spray. Fine leaf fescues are viewed as especially useful for settings experiencing variable light conditions and poor soils.



Allelopathy

Over the last decade, the study of plant-plant interactions and utilization of allelopathy and plant interference as a potential weed management tool has received increasing attention. The use of allelopathy for weed management relies upon the species-specific responses of a target weed to chronic or sublethal doses of an allelochemical (plant growth inhibitor), which can be exuded or leached from nearby living plants or decomposing residues. Weed suppressive cover crops that have been successfully used to suppress annual weeds have included economically important cereals such as wheat, oat, rye, barley, sorghum, and rice.

Although studies on allelopathic crops have focused on these key species, many other weedy and crop species show promise of allelopathic potential for suppression of surrounding vegetation, including several turfgrasses such as

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Top: tall fescue inflorescence. Middle: collar region of a tall fescue plant. Bottom: turf habit and vegetative growth characteristics of tall fescue.

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Although studies on allelopathic crops have focused on economically important cereals such as wheat, oat, rye, barley, sorghum, and rice, many other weedy and crop species show promise of allelopathic potential for suppression of surrounding vegetation, including several turfgrasses such as buffalo grass, perennial ryegrass, bermudagrass, and both tall and fine fescues.

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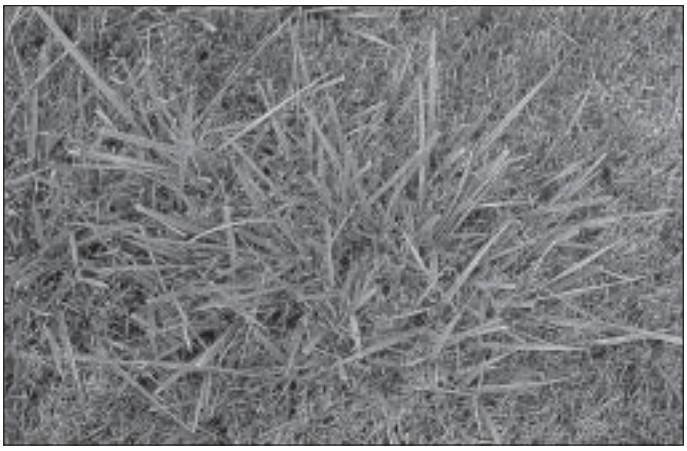

buffalo grass, perennial ryegrass, bermudagrass, and both tall and fine fescues. However, until now, few studies have been conducted to further evaluate the weed suppressive potential of these species. Our recent trials with weed suppressive ornamental groundcovers and turfgrasses for the New York State Department of Transportation have shown that the ability to establish rapidly, produce a dense turf or canopy thereby reducing light availability at the soil surface, and allelopathic properties can all influence weed suppressive ability.

Prior studies have focused on the weed suppressive effects of tall fescue, which was shown to be potentially allelopathic by production of toxic root leachates.

A review of the literature shows that *Festuca* spp. can be strongly weed suppressive when used for erosion control in agronomic, orchard and vineyard settings. Prior studies have focused on the weed suppressive effects of tall fescue, which was shown to be potentially allelopathic by production of toxic root leachates. In 1990 studies in Kentucky, we demonstrated that creeping red fescue (*F. rubra* L. spp. *rubra* and ssp. *tricolphylla*) was highly weed suppressive when established as a living mulch or as killed sod in no-tillage field experiments.

Field Studies

Recently, we conducted a series of field studies in Ithaca, NY and in Riverhead NY, with Dr. Andy Senesac which show that certain cultivars of creeping red, chewings or hard fescue exhibit the ability to effectively suppress weeds over a multi-year period. An initial study was conducted in 1999-2002 as part of the National Turfgrass Evaluation Program (NTEP) to evaluate a collection of 78 fine leaf fescue cultivars for turfgrass quality, seedling vigor, and ability to suppress the establishment of common annual and perennial weeds.

The fine fescue cultivars Intrigue, Columbra, and Sandpiper proved to be more weed suppressive (less than 5-8% weed infestations) over time than other fine leaf fescue cultivars. Reliant II, Wilma and Oxford were also good performers in terms of weed suppression, while Treasure, Boreal, Rebel II tall fescue, Sylvia High and several numbered selections were much less suppressive (greater than 15-30% infestations).

Using these criteria, Dr. Frank Rossi evaluated the overall suitability of the cultivars for use in turfgrass settings, and we evaluated their potential to inhibit the establishment of common turf weeds, including large crabgrass, annual bluegrass, white clover and dandelion. Weed suppressive ability was visually evaluated, and several cultivars consistently produced dense stands of high quality turf and provided good to very good (greater than 70%) suppression of common turf weeds when established using the same planting density. Other cultivars provided moderate (between 35% - 70%) to (< 30%) little weed suppression.

In her M.S. work at Cornell, Cecile Bertin showed that greater weed suppression was likely associated with the differential ability of fescue cultivars to establish rapidly and maintain a dense turf as well as their potential to exhibit allelopathic interference. Laboratory studies indicated that certain fine leaf fescue cultivars exhibited greater ability to suppress weeds in agar or sand culture, through production of large quantities of inhibitory root exudates from fine fibrous fescue roots. Other cultivars which were less suppressive in field experiments, were also less suppressive to weed growth in the laboratory. Interestingly, fescue roots cultured under simulated drought conditions produced up to 3-fold greater levels of root exudates than did those cultured under non-stressed conditions.

Top: a plot of tall fescue.
Bottom: seeds from tall fescue.

In additional field studies conducted in Ithaca and Riverhead — with a selection of cultivars with variable weed suppressive performance and using a large number of replicates for statistical power — the fine fescue cultivars Intrigue, Columbra, and Sandpiper proved to be more weed suppressive (less than 5-8% weed infestations) over time than other fine leaf fescue cultivars. Reliant II, Wilma and Oxford were also good performers in terms of weed suppression, while Treasure, Boreal, Rebel II tall fescue, Sylvia High and several numbered selections were much less suppressive (greater than 15-30% infestations). All cultivars were established at a seeding rate of 4 lb/1000 sq. feet. Although our data suggest that certain cultivars possess differential ability to suppress weeds over time, further studies are required to improve our understanding of the factors influencing weed suppression over time, including the impact of root exudation by weed suppressive cultivars.

What Makes It Work

With Dr. Frank Schroeder in the Chemistry Department at Cornell, we isolated and identified the main bioactive constituent in the inhibitory root exudates collected from the chewings fescue cv. Intrigue. This highly active inhibitor was identified as m-tyrosine, a simple derivative of p-tyrosine. M-Tyrosine was found in large quantities in root exudates of chewings fescue cultivars, strong red creeping cultivars and Arizona fescue. It suppressed weed seed germination and seedling growth in both soil and soilless assays, generally at concentrations of 100uM or less, which are in the range of application rates of several preemergent herbicides such as pendimethalin.

Similarly, m-tyrosine exposure at low concentrations resulted in stunted root growth, reduced cell division and likely impacts on cell elongation or cell wall formation in developing weed seedlings. The inhibitor is not highly selective in that it is active with every weed and crop species tested, but large crabgrass, barnyardgrass, dandelion, mustard, cress, and other small-seeded weeds are highly sensitive to its presence. Currently, we are attempting to further identify its mode(s) of action, and determine, with industry support, its potential to be developed as a soil-applied natural herbicide.

In ongoing studies with the NYSDOT and Dr. Senesac, we are evaluating a diverse collection of 25 turfgrass species and cultivars for their ability to establish across New York in a variety of field and roadside settings. Our better *Festuca* performers are part of this trial. The ultimate objective is to select a turfgrass cultivar or mixture that is tolerant of drought, salinity and low fertility, requires limited mowing, and establishes successfully such that it is weed suppressive.

A daunting task? Perhaps, but our collaboration with Dr. R. Brown, a turfgrass breeder, at the University of Rhode Island to select for enhanced weed suppression and stress tolerance among existing cultivars of creeping red, chewings and hard fescues as well as fescue/perennial ryegrass hybrids will help us to address this goal.

Although the selection of highly weed suppressive turfgrasses is novel from both a traditional and molecular perspective, the development of fescue turfgrasses with enhanced stress tolerance is not. The combination of these attributes will hopefully lead to the future development and release of value-added turfgrasses which have utility as weed suppressive turfs in low maintenance settings, including roadsides as well as landscapes. In addition, attempted crosses or hybridization with closely related species such as perennial ryegrass may lead to characteristics including more rapid establishment and growth as well as enhanced weed suppression and stress tolerance.

Leslie A. Weston and Cecile Bertin

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NYSTA Update

Empire State Gre
A Look Back at a

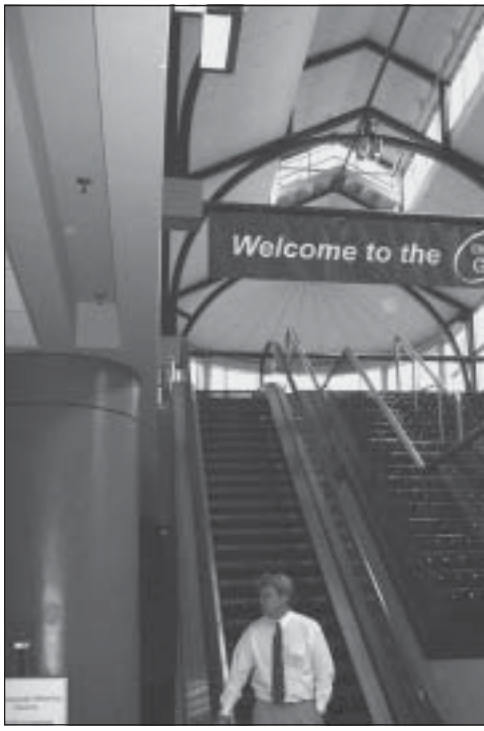
The Empire State Green Industry Show, combining the conference and trade shows of the New York State Turfgrass Association (NYSTA), New York State Nursery/Landscape Association (NYSN/LA), New York State Arborists–ISA Chapter (NYSA), and New York State Flower Industries (NYSFI), proved to be an outstanding event.

"Growing Together" took place at the Rochester Riverside Convention Center November 15-17, 2005 and attracted 2,000 people from a wide variety of green industry professions. Golf and sports turf related professions represented 32.6% of all paid attendance. Other occupations were represented as follows: nursery and greenhouse/lawn and landscape, 21.7%; grounds maintenance (including schools), 19.9%; arborists, 10.8%; sales/manufacturing, 5.8%; parks/recreation, 5.2%; misc., 4%.

Grassland Equipment & Irrigation Corp., Inc., Latham NY, a distributor of Toro equipment, exhibits at the 2005 Empire State Green Industry Show.

When asked if they believed the involvement of all the green industry associations enhanced the quality of their education and overall experience at the show, 95% of those surveyed indicated that it did.

The Empire State Green Industry Show featured green industry products and services at a 300-booth trade show. The majority of trade show exhibitors who responded to the survey also indicated that the involvement of all the green industry associations enhanced their overall experience and nearly all said they would or most likely would exhibit again at next year's show.



The Empire State Green Industry Show banner welcomes took place November 15-17, 2005 at the Rochester River combine the conference and trade shows of the New Yor Arborists–ISA Chapter, New York Flower Industries, ar

According to Bud Nestler, an exhibitor with Princeton Nurseries, "It was a good decision to combine several association conferences into one conference and trade show. The cross section of customers seemed to create interest in products other than the primary needs of the customer. For example, although golf course superintendents and grounds maintenance people go to the show to see primarily turf equipment,

NEW YORK STATE TURFGRASS ASSOCIATION

en Industry Show Sucessful Event

s attendees to "Growing Together'. The conference, which rside Convention Center in Rochester, NY, was the first to k State Nursery/Landscape Association, New York State nd New York State Turfgrass Association.

fertilizers and various plant protectants, the secondary need for trees, shrubs, annuals and perennials can now be satisfied. Also, by having one show for several different areas of the horticultural profession, the cost is reduced as well as time spent away from the job. One can potentially cover all the product needs in one or two days instead of traveling to a number of small shows to do the same thing."

Jackie Crane, NYSN/LA President and Certified Nursery Professional with Little York Plantation said, "The first annual Empire State Green Industry Show was even more successful than expected. The vendors have expressed their pleasure with the new partnership of the green industry organizations and the set up of the trade show. This is a win-win situation for participating green industry professionals, suppliers and the organizations. I would encourage those affiliated with the nursery and landscape industry in New York to attend our next Empire State Green Industry Show."

David Green, 2005 NYSFI President believes the show offered great benefits to NYSFI members. "There is no other educational program in the northeast that provides members with the updates they need and new information they can use. It is great to see how working together with other green industry associations provides a large network of opportunity."

Brian Skinner, Secretary/Treasurer of NYSA, agrees. "This event allowed our members a unique opportunity to be exposed to other educational and equipment facets of the industry that they might not normally have at one time, or in one location. Members had opportunities to learn about subjects and problems that they often confront in their daily work routines, as well as updating their knowledge and skill sets within the field of arboriculture. The same is true for all those in turf, landscape, golf course, flower

Unilock, Inc.., a manufacturer of concrete pavers and retaining walls in Buffalo, NY, hosts visitors at the 2005 Empire State Green Industry Show.

Opposite page bottom: New York State Nursery/Landscape Assoc. and New York State Turfgrass Assoc. leaders meet at the first annual Empire State Green Industry Show. From left: Michael Maffei, CGCS, NYSTA President 2006; James Diermeir, CGM/CNP, NYSTA President 2005; Bob Smith, CNP, NYSN/LA President 2006; Jackie Crane, CNP, NYSN/LA President 2006.

This page bottom: New York State associations gear up for the 2006 Empire State Green Industry Show. From left: Dave Green, NYSFI President 2005; Jackie Crane, CNP, NYSN/LA President 2006; Michael Maffei, CGCS, NYSTA President 2006; Owen Regan, NYSTA Vice {resident; Brian Skinner, NYSA–ISA Chapter Secretary/ Treasurer

Green Industry Show

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Top: Horticultural Associates of Rochester, Inc., a company that provides wholesale nursery stock for landscape contractors, garden centers, landscape architects, and municipalities, exhibits at the 2005 Empire State green Industry Show.

industry, nursery, and buildings and grounds professions. Our professional careers cross paths many times and we often work for or with each other. Finally, we have a statewide conference where we can all meet, talk and learn from our green industry peers. Following upon the success of the first Empire State Green Industry show last November that brought all the green industries together under one roof, the NYS Arborists - ISA Chapter, Inc. looks forward to a bigger and better event in 2006! "

Michael Maffei, NYSTA President and Certified Golf Course Superintendent with Back O'Beyond, Inc., was pleased with the cross-section of attendees but says he'd like an even better turnout in 2006. "This is the first time our associations have joined together to produce one combined conference and trade show. We all agree that this event was a great success that can only get bigger and better with time. What is exceptional about this show is that although all of the resources of each association are combined, the integrity of each individual show has been maintained.

Middle: Northern Nurseries, Inc., Fairport, NY, a company that offers nursery stock, soil amendments, seed products, and fertilizers for green industry professionals.

In other words, each association was careful to include their traditional meetings and events designated for their members. These events included award ceremonies, meetings, dinners, receptions, contests, auctions, certification exams and membership orientations. However, there were also plenty of opportunities for all attendees to come together and share information, network, and learn from each other. Speaking as a golf course superintendent, the Empire State Green Industry Show provides a wonderful occasion for turf professionals to enhance their careers and exchange ideas with people from all segments of the green industry."

The 2006 Empire State Green Industry Show will again be held at the Rochester Riverside Convention Center in Rochester, New York on November 14-16, 2006. For more information on the 2006 Empire State Green Industry Show, call the show office 1-800-873-8873, (518) 783-1229, or visit our web site at www.nysta.org.

Bottom: R&R Power Turf from Ontario, Canada, manufactures a self-propelled power top dresser for lawn care professionals, on display at the 2005 Empire State Green Industry Show.

Searching for the Plum Pox Virus

Plum Pox, also known as Sharka, is a viral disease of stone fruit trees such as plum, peach and apricot. It has been a devastating disease in Europe since the early 1900s, where it was first reported in Bulgaria, then spread throughout Europe. In recent years the disease has spread to the Americas, first being found in Chile in 1992, then in the orchards of Adams County, PA, in 1999, and in Ontario and Nova Scotia, Canada in 2000.

The disease remains localized at this time and it is hoped that it will be contained and eradicated before it has a chance to spread to the other parts of the North American continent. New York State Agriculture & Markets and Cornell University have established an extensive survey program to survey about 15,000 trees during the 2003, 2004 and 2005 growing seasons.

No Plum Pox virus was detected during the 2003 and 2004 growing season. All samples were processed using the Durviz ELISA kit. One replicate of each sample was created and processed in adjacent wells of the ELISA plate. Plates were read using a plate reader set at 405nm. Samples were determined to be positive if their absorbance value reached 2.5 times the negative control value.

Additionally, a subset of approximately 300 random samples were selected to be processed using immunocapture-reverse transcription polymerase chain reaction (IC-RT-PCR) analyses. No positives have arisen to date. In 2005, the Plant Disease Diagnostic Clinic provided testing for Michigan growers wishing to ship plant material into Canada. Approximately 440 samples were tested.

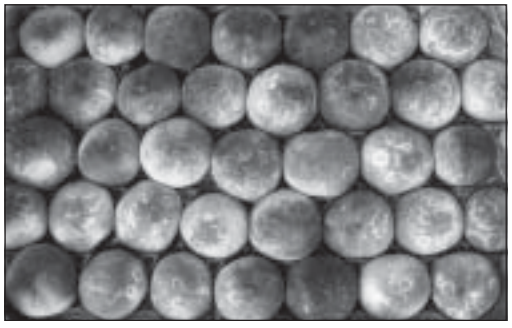
We will continue to conduct these surveys due to our close proximity to the Pennsylvania and Canadian confirmed positives.

Karen L. Snover-Clift and Patricia Clement

Above: plum pox virus mottles a leaf of a plum tree.

Below left: plum pox virus' effect on the stones of apricots.

Below right: plum pox virus affects a variety of fruits including peaches.



Program Spotlight

Plum Pox, a viral disease of stone fruit trees, has been a devastating disease in Europe since the early 1900s. It has spread to the Americas, first being found in Chile in 1992, then in the orchards of Adams County, PA, in 1999, and in Ontario and Nova Scotia, Canada in 2000.

New York State Agriculture & Markets and Cornell University have established a survey program due to our close proximity to the PA and Canadian confirmed positives.

CUTT

Program Spotlight

What if we had to be certified to apply fertilizer the way many turf managers have to be to apply pesticides? What if the government set a limit on the amount and type of nutrients you could use in a season? While these seem farfetched, there are some signs that fertilizer regulation is on its way.

Coming to a State Near You: Nutrient Management

Nutrient management is a key aspect of golf turf maintenance. Fertilization influences many aspects of turfgrass management including playability, visual quality and wear tolerance.

What if we had to be certified to apply fertilizer the way many turf managers have to be to apply pesticides? What if the government set a limit on the amount and type of nutrients you could use in a season? While these seem farfetched, there are some signs that fertilizer regulation is on its way.

We have grown accustomed to environmental regulations for irrigating golf courses and using pesticides. Nutrient management, specifically fertilizer use, has heretofore been immune to the rash of regulations.

New Laws in the Midwest

Consider that a state law went into effect in Minnesota on January 1, 2004 and a local ordinance effective January 1, 2005 in Madison, WI regulating the application of phosphorus (P). These regulations are intended to reduce overall use of P in an effort to minimize P loading of surface water bodies. The MN law includes golf courses while the Madison ordinance does not, for now.

The contribution of P to lakes and streams results in severe algal blooms that degrade water quality for recreation and consumption by reducing dissolved oxygen levels. The "greening" of the lakes in these sensitive Midwestern communities has made turf management an easy target: fertilizers run off lawns and pollute the lakes.

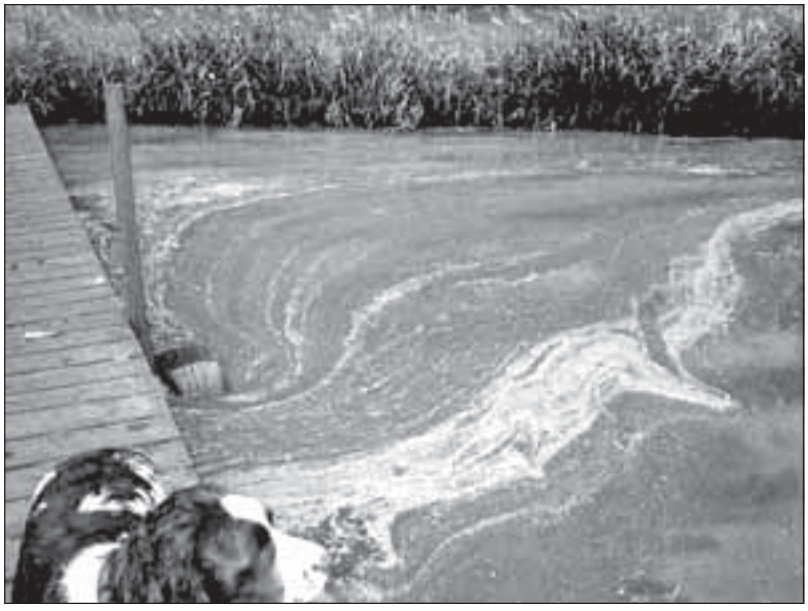
While it appears the initial intent of the regulations was targeted at home lawns surrounded by impervious surface, the MN ordinance does include P application to golf courses. What seems funny is that with large P contributions likely coming from septic and sewer systems, banning P on turf feels like worrying about a mouse when an elephant is going to run you over. Nevertheless, New York is considering similar regulation, as is the state of Maine; the regulation frenzy is underway.

Phosphorus is required in relatively large amounts by turf, surpassed only by nitrogen and potassium. Phosphorus is critical for photosynthesis, energy management and membrane function, all vital components of plant growth and P is relatively immobile in the soil, it is tightly bound in the top few inches.

An Important Assumption

An important assumption was made prior to passing the P regulations that is worthy of exploration. First, it is thought that soils that have tested high in P are more prone to P runoff than low P soils. Therefore, the P bans require a manager to have a soil test that indi-

An algal bloom caused by excessive nutrient loading resulting from runoff from applications to a home lawn.



cates they need P before it can be applied. Beyond any simple questions of enforcement, I'd like to challenge the premise that there is a link between soil test P and P runoff.

Let's start with the fact that there are no completed turf studies that correlate soil test P with runoff P concentration. However, several published turfgrass studies have indicated the relationship between turf density (not soil nutrient status) and runoff: the less dense turf results in significantly greater runoff of all nutrients, not just P.

Turf density is governed primarily by nitrogen; therefore, it is likely that soil test P has little to do with amount of P runoff. In fact, a preliminary study underway at Cornell University indicates, as expected, that nitrogen fertilization is correlated to P runoff, independent of soil test P levels.

The MN regulations created a provision for golf courses to be exempt from the P statute if they attend a certified training program. The P Fertilizer Training Program includes training in the P law, soil and tissue testing, basic soil science, P chemistry, and plant nutrition.

Nitrogen Regulation Next?

The P regulation is a harbinger of what lies ahead. Consider the 100,000 acre Peconic Bay Estuary in eastern Long Island, NY. Prior to the mid-1980's, Peconic Bay provided about 500,000 lbs. of bay scallops per year. By 1996 the harvest was reduced to 50 lbs per year. The massive dropoff was related to Brown Tide, a recurring algal bloom brought on by nutrient loading due to increased development around the bay.

A Comprehensive Conservation and Management Plan to address the Brown Tide is being implemented. This plan expects to receive about $300 million to meet pollution reduction goals. In this case, the nutrient of concern is nitrogen (N) not exclusively P.

Nitrogen is thought to be the limiting nutrient in the Peconic Estuary and, when supplied, results in the Brown Tide. Singling out N is significant in that you simply cannot have good golf course turf without N. Additionally, as research has indicated, N has a significant effect on runoff and likely leaching as well. Slightly over 30 golf courses will be affected when the plan, which is in its early phase in 2004, is fully implemented.

The plan calls for annual N use rates over the entire golf course be less than 2.85 lbs. of actual N per 1000 square feet. There are many questions being raised by this type of plan. It is not a law per se, but clearly golf courses will be expected to comply.

Regulating nutrient management may not be perceived to be as volatile or alarming as pesticide regulations, but for sure, the influence could be greater. You won't need pesticides if you cannot fertilize your turf.

It's time to consider how to justify your fertilizer practices. There is a significant amount of research available to assist with the discussion, but as with most areas, more is still needed.

Now is the time to embrace coming changes by educating yourself and adapting. If we do not react proactively with education, change will be forced upon us with regulation.

Frank S. Rossi

Top: Peconic Bay Estuary suffered a massive decline in scallop harvest due to Brown Tide.

Bottom: Brown Tide, a recurring algal bloom brought on by excessive nutrient loading due to increased development around the bay.

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Seasonal Update

On Long Island, we usually see germination begin in early May and continue into August. It is simply asking too much of a single preemergence application to persist for 3 to 4 months. For this reason, a split application (half applied in April and half or two thirds applied in June) will extend the control period considerably.

Crabgrass: From Valuable Grain Crop to Hated Weed

There are two species of crabgrass that are troublesome weeds in the North east. Smooth, or small, crabgrass (*Digitaria ischaemum*) is a common problem in turf, landscaped areas and container nurseries. Large, or hairy, crabgrass (*Digitaria sanguinalis*) is more commonly seen in field and row crops.

Crabgrass was one of the earliest grain crops, preceding wheat and other grains in its native lands of Africa and Asia. In the 1880s, crabgrass was intentionally introduced into the US to serve as a drought-tolerant forage crop for cattle in the south. When other more nutritious crops replaced crabgrass, it escaped and became a very successful weed!

Crabgrass is probably the most troublesome annual weed that we have, annually costing millions of dollars for control by chemicals and mulches. Despite this intensive level of control, crabgrass continues to be a serious weed in many of the same sites that it is managed, like home lawns and landscaped areas.

Many Unhappy Returns

There are many reasons for the annual return of crabgrass. It has several characteristics of an 'ideal' weed. It produces prodigious numbers of nutrient-rich seed. This source of fat and protein is readily consumed by migrating birds and other wildlife in the fall as they prepare for winter. Not all of the seed is completely digested, and birds act as a major source of movement of crabgrass seed to new sites.

Crabgrass is also very 'plastic'. For instance, a single plant can grow into a large available bare spot on a lawn, producing many tillers and seed heads. However, if many seedlings were to emerge in that same bare spot, the individual plants would be crowded by their neighbors, but in total, the same number of seed would still be produced within the bare patch. This characteristic allows the weed to compensate for variability in germinating seed population to still produce sufficient number of seed to overwinter for the next season.

Crabgrass Management

There are several preemergence herbicides which can be very effective in preventing crabgrass from establishing in the spring. These can be used in turf, landscaped areas, nurseries, and in the field. Refer to the *Cornell Pest Management Guidelines* for specific information.

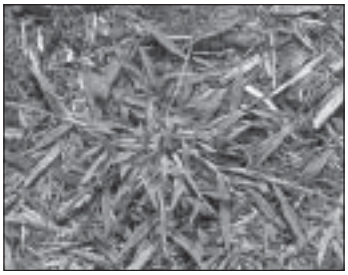
In turf, particularly, there is often a problem with obtaining season-long control of crabgrass with a single preemergent application made in early spring. This is partially due to the long period that crabgrass can germinate. On Long Island, we usually see germination begin in early May and continue into August. It is simply asking too much of a single preemergence application to persist for 3 to 4 months. For this reason, a split application (half applied in April and half or two thirds applied in June) will extend the control period considerably.

Post emergence crabgrass herbicides are also an option to manage late germinating escapes. To get the most out of them, applications should be made to young crabgrass that is growing healthily, especially not under drought stress.

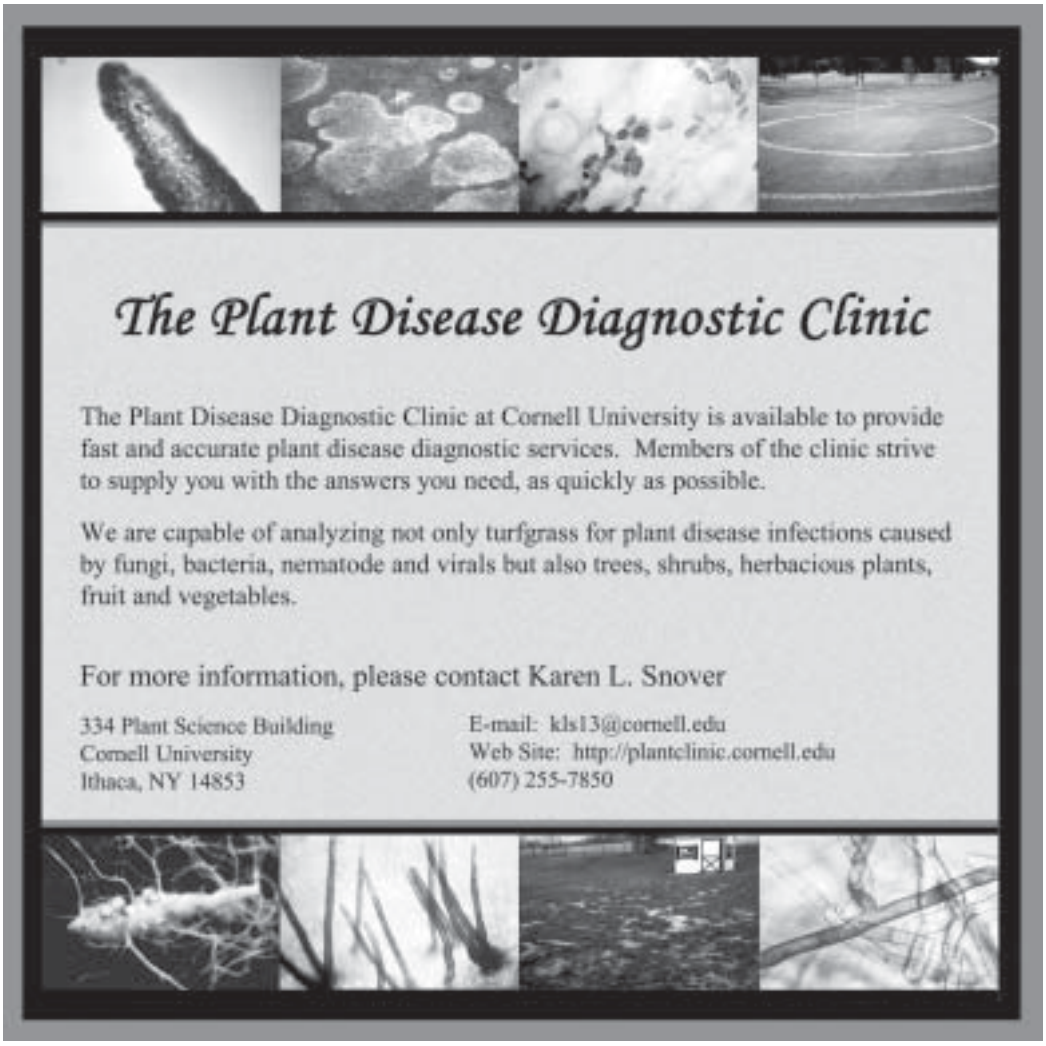
Maintaining a high mowing height and proper fertilization regime will help to keep the soil beneath the turf canopy cool and shaded. These conditions will reduce crabgrass germination and vigor.

In landscaped beds, organic mulches are often applied to manage this weed. However, because crabgrass can root at the stem nodes as it spreads, it is difficult to hand pull if allowed to grow to a point where the tillers (side shoots) begin to grow. Early detection and action are important to keep this weed in control.

Andy Senesac



Left: specimen of large crabgrass plant. Middle: specimen of smooth crabrass plant. Right: large crabgrass growth habit.



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Wastewater Use for Turf

A Healthy Ecosystem

Major northeastern metropolitan water suppliers are required to double the supply capacity of their systems for the three summer months that are dominated by landscape irrigation demands.

The availability of fresh water for irrigation in many parts of the United States is becoming critically limited. This is especially true for irrigation of nonfood and fiber productions sites including parks, commercial and residential lawns, athletic fields, golf courses, cemeteries, sod farms, and other landscape plantings. This is true even for the northeastern US where many people perceive an abundance of fresh water. Major metropolitan water suppliers in the northeastern US are required to double the supply capacity of their systems for the three summer months that are dominated by landscape irrigation demands.

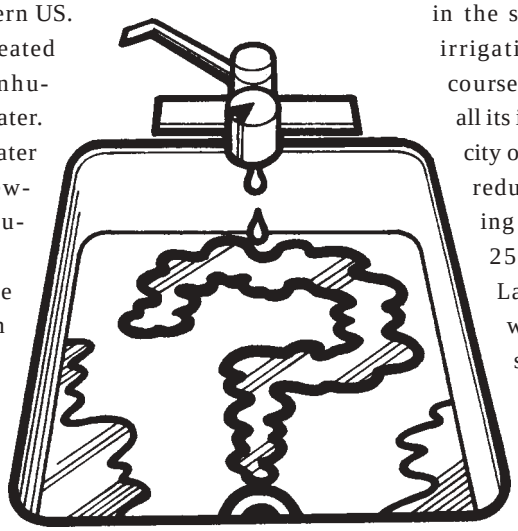
As urban and suburban sprawl continues to grow, the demand for freshwater resources also increases. There is an obvious need to consider water conservation and the use of alternative water sources for landscape irrigation. Wastewater has long been successfully used for irrigation in the southwestern US. Wastewater includes treated sewage effluent and nonhuman wastewater, gray water. Most large-scale wastewater irrigation comes from sewage treatment plant effluent.

The benefits of waste water as an irrigation source include: conservation of freshwater that would be used for irrigation, supply of small amounts of nutrients to enhance plant growth every time the site is watered, and a reduction of pollutant (phosphorus and nitrogen) discharge into surface water.

The potential hazards from wastewater irrigation involve salt injury to plants, long term effects on soil health (reducing drainage, increasing runoff/erosion), other soluble compounds in the water, and human pathogens in the wastewater. Proper water treatment has all but eliminated the human pathogen issue. Long-term use of wastewater irrigation of turfgrass sites in Arizona, a low rainfall area, has been shown to increase salt levels in the soil which could harm plant growth and destroy the structure of soils with clay.

In the northeast there has been very limited use of wastewater for irrigation. For example, in New York, just two of 850 golf courses in the state use wastewater for irrigation. One 36-hole golf course in Lake Placid, NY gets all its irrigation water from the city of Lake Placid; the city has reduced its phosphorus loading into Lake Champlain by 25 percent. To date, the Lake Placid golf courses, which have very sandy soil, have seen no turf damage from salt.

A. Martin Petrovic



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