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CIRCLE NO. 123

*Continued from page 50*

success has everything to do with who's running the show. When Cannon became executive director of the Cactus and Pine GCSA about four years ago, the association was floundering. Cannon says the chapter was in a sorry state partly because its board members, working superintendents, didn't have time to run it.

"But if you have someone who's hired to think and act on behalf of the membership, you'll have a stronger organization," Cannon says. "Members gave me the authority to lead them in the direction they needed to go. By having me as executive director, the board gained power and leadership."

White, who has been at Georgia GCSA for 12 years, started as part-time executive director but convinced the board it was a full-time job. She must be doing something right — the association has grown during her tenure to about 900 members from 350.

**"We try to bring in good speakers that members know."**

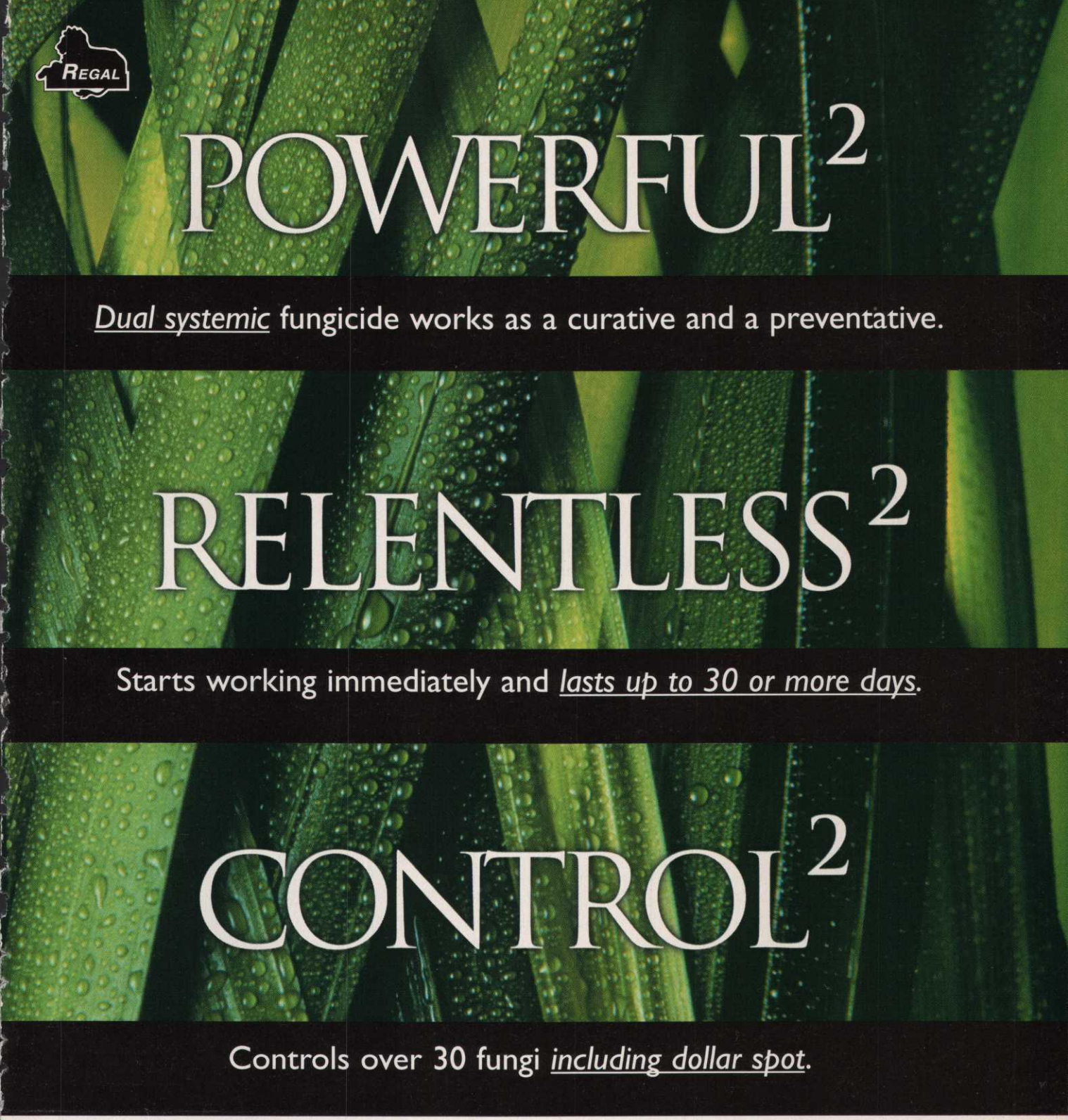
LYNNE CANNON
EXECUTIVE DIRECTOR
CACTUS AND PINE GCSA

White says it's her goal to keep in touch with her superintendents' concerns. "We do our best to walk in our members' shoes," she says of her staff.

White and Cannon have created strategic plans for their chapters, which is vital to their success, Bretthauer says. "A clear direction of where a chapter is heading will provide incentive for people to become involved with it, which will help the association achieve its goals," he adds

But chapter associations will always have their critics. Clemans says smaller Oregon superintendents say they feel alienated by the Oregon GCSA. They claim the association costs too much to join and is only for selected members. "They view the association as that 'country club group,' and they don't want to be a part of it," Clemans says.

Clemans sympathizes with the detractors, but he says they should consider joining, mainly for professional reasons. "They need to know that it's good to be involved in an association," he adds. ■

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CIRCLE NO. 121

# Amino Acids Absolute

## Products help superintendent solve effluent irrigation woes

BY DAVID JEWELL AND LARRY AYLWARD

**Problem**

After 22 years of irrigating with effluent water, the fairways at White Pines GC began to die from a tremendous buildup of sodium in the soil, which also had a high pH.

**Solution**

The use of amino acid products provides the turf with more energy to pull nutrients and water from the soil more effectively.

The news from the lab was unfortunate. White Pines GC superintendent Steve Partyka was told his Bensenville, Ill., golf course's soil analysis revealed the dirt was so poor that it wasn't fit for growing turf.

It was 1998, and Partyka knew something was wrong. After all, 75 percent of the turf on the fairways of the 36-hole municipal complex was dying. But Partyka didn't expect news this bad.

The lab's soil analysis revealed the course's salt index was a whopping 330 pounds per acre. An index of 50 pounds per acre is considered high. So it was obvious to Partyka why most of the fairways were dying.

But what wasn't obvious was the source of the problem. "I figured it had something to do with the effluent water we used for irrigation," Partyka says.

### The problem

Before 1976, the fairways at White Pines weren't irrigated. The course only watered its tees and fairways with well water.

But in 1976, when Partyka was a part-time laborer at the course and his father, Ed, was superintendent, White Pines installed a new irrigation system for greens, tees and fairways with a watering capacity of 2,400 gallons per minute. (The previous system's capacity was 600 gallons per minute.) The course, however, didn't have enough well water to support the system. It had to use Bensenville's effluent water to sustain the new irrigation system.

Since 1976, the water irrigating the course has been a mixture of 80 percent effluent water and 20 percent well water. Partyka, who succeeded his father as superintendent of the course seven years ago and was his assistant 11 years before that, has monitored greens and tees for sodium buildup from the effluent water. He often treated the greens and tees with gypsum to leach the sodium out.

But Partyka never treated the fairways. After 22 years of effluent irrigation and little treatment, a major problem hit.

The summer of 1998 was warm and dry. The season's aridness had a terrible impact on White Pines' sodium-laden fairways. In late July and early August, the fairways began to die.

Partyka now knows it was because of the

PHOTOS COURTESY OF JEWELL, BAKER AND ZANDER

**Superintendent Steve Partyka heard about Nutramax Laboratories' products from several sources, including chatting online with superintendents.**

tremendous sodium buildup over the previous 22 years in combination with the dry summer. Consequently, the soil also had a high pH. Since there was no rain, there was no fresh water to knock back sodium counts. "So every time we watered, it was like spreading salt out there," Partyka says.

Partyka says he never figured the sodium count would climb so high on the fairways. He attributes that to not knowing the sodium count in the effluent water.

"The EPA doesn't regulate the sodium in effluent water," he says. "So the sodium count can be high one day and low the next. You don't know what you're getting from day to day."

Partyka, however, was not about to let the bad news get to him. He scoured the Internet for products to help grow turf in salt-saturated soil. His rootless turf needed help — fast.

**The damaged fairways have transformed into lush, green turf with a 10-inch root system. "I've built my program around the amino acids," Partyka says.**

## The solution

Initially, the obvious things to do were aerify the fairways and seed the bad areas. Then Partyka and his crew spread gypsum at a rate of 25 pounds per 1,000 square feet. But Partyka knew the fairways needed something else.

Partyka learned about Edgewood, Md.-based Nutramax Laboratories' products from several sources, including by chatting with other superintendents online. In the late fall of 1998, he attended an association meeting and stopped by the Nutramax booth. He chatted with a Nutramax representative and told him of his fairway problem. The representative advised Partyka to try the company's line of amino-acid based products. Now they're the base of Partyka's turf-care program.

On April 1, 1999, Partyka and his assistant, Joe Giuliano, applied Nutramax's Macro-Sorb radicular for the first time at 4 ounces per 1,000 square feet. The radicular delivers L-amino acids to enhance root mass production. Partyka used it in combination with a biostimulant and a wetting agent. He and his crew kept applying the same combination every two weeks.

When the soil temperature reached 55 degrees, Partyka substituted the Macro-Sorb radicular with Macro-Sorb foliar at 1.5 ounces per square feet, which adds specific L-amino acids to turf to make water and fertilizer last longer. Partyka and his crew used this mix every two weeks through mid-September.

The amino acids in the products provide turf with more energy to pull nutrients and water from soil more effectively.

Partyka and Giuliano continued the Nutramax program in 2000 and 2001. Partyka has seen steady progress, even though the turf's pH is still high (it was 9.58 last year). The damaged fairways have transformed into lush, green turf with a 10-inch root system.

"I've built my program around the amino acids," he says. "It's like our Bible. We never miss an application from April through September."

There are added and unexpected benefits as well. Partyka has decreased irrigation, thanks to the Macro-Sorb foliar. He irrigates less than he did a year ago.

Partyka says the foliar also allows him to reduce application of his organic fertilizer to 1.5 pounds per 1,000 square feet from 4 pounds per thousand square feet. "I never thought I could go that low," he says.

Partyka also reduced his fungicide applications thanks to the radicular, which helps turf fight off certain diseases so less fungicide is needed.

While Partyka sprays an insecticide to control grubs, he believes the Nutramax program also functions as a strong grub-control process. The turf's roots are so thick and deep that grubs can't destroy them, Partyka says. "Skunks and raccoons can't pull back the turf because the roots are so strong," he adds. (Hence, Partyka has saved money because he's cut back on insecticides.)

Partyka says Nutramax's amino acids are easy to use, are compatible with other products, and they don't clog the sprayer. Of course, they offset sodium from effluent water to make for healthy fairways — and provide peace of mind to worried superintendents. ■

*Editor's note: Jewell is president of Jewel Baker Zander, a public relations firm in Kansas City, Mo.*

**Read another Real-Life Solutions article on page 70**



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CIRCLE NO. 133



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TURFGRASS TRENDS

Turfgrass Section • Volume 11, Issue 2 • **February 2002**

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DISEASES

# Fungicide Combination Treats Summer Stress Syndrome

*By J. M. Vargas Jr.*

A study in 1990 by Dr. L. T. Lucas of North Carolina State University identified a complex of pathological and physiological factors that cause cool-season grasses to decline in quality during the South's warm summer weather. Physical factors such as lack of morning sun, shade, poor air movement, poor water utilization by the grass and compacted soil also contributed to this syndrome, which Lucas called Summer Bentgrass Decline.

To combat the problem, Lucas recommended biweekly applications of Aliette and Fore beginning in the spring and continuing until the cool weather to prevent it.

Since Lucas' study, the practice has been widely accepted in the southeastern United States, where creeping bentgrass goes under tremendous stress from hot summer temperatures. The next step was to see if the same complex of problems that Lucas identified in his study occurred in the northern United States.

The key to having this program be a success is applying the products before the arrival of warm weather.

To get an answer, researchers at Michigan State University posed the question about whether one would see such a dramatic effect on creeping bentgrass in the northern United States where the summers are not as severe.

They also wondered what effect, if any, the fungicide combination that worked so well in the South would have on annual bluegrass turfs, which make up the majority of greens in the North.

The MSU studies showed that the same improvement in turfgrass quality could be obtained in the northern United States on both creeping bentgrass and annual bluegrass greens and fairways as seen in the South (Tables 1 and 2).

Since the MSU study expanded the number of turfgrasses affected by Lucas' com-

**TABLE 1**

**Quality ratings for Summer Stress Syndrome on a Creeping Bentgrass Green**

| TREATMENT/ 1,000 SQ. FT. | TURF QUALITY |
|---|---|
| Signature 4 oz + Chipco 26GT 4 fl oz | 8.5a |
| Signature 4 oz + Daconil Ultrex 3.8 oz | 7.8ab |
| Untreated Control | 6.5c |

ALL TREATMENTS APPLIED ON 14-DAY INTERVALS

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## IN THIS ISSUE



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**TABLE 2**

**Quality ratings for Summer Stress Syndrome on an annual bluegrass fairway**

| TREATMENT/1,000 SQ. FT. | TURF QUALITY |
|---|---|
| *MPK 5/acre + Daconil Ultrex 1.5 oz | 8.0a |
| Nutri Grow P+K 4 oz. + Daconil Ultrex 3.8 | 7.8a |
| Nutri Grow P+K 3 oz. + Daconil Ultrex 3.8 | 7.5a |
| Nutri Grow P+K 2 oz. + Daconil Ultrex 3.8 | 7.5a |
| Untreated Control | 5.3b |

ALL TREATMENTS APPLIED ON 14-DAY INTERVALS EXCEPT* / * TREATMENT APPLIED ON 7-DAY INTERVAL

plex, Summer Bentgrass Decline no longer accurately described the problem. Therefore, the MSU researchers changed the complex's name to Summer Stress Syndrome.

Representatives from the company that produces Aliette and Fore say they discovered the green pigment in Fore contributed to an improved quality turf. Then the company incorporated the pigment into Aliette and called the new product Chipco Signature. This allowed products other than Fore to be combined with Chipco Signature to prevent Summer Stress Syndrome. Two of the most successful products combined with Signature were Daconil Ultrex and Chipco 26 GT. These products helped control dollar spot, which is more of a problem in the northern United States.

These combinations were successful in most cases in controlling Summer Stress Syndrome. The lone problem occurred somewhere in the 10- to 14-day point interval between treatments, when the combination's control of brown patch broke down. This was solved by adding Heritage to the mixture, which not only controlled brown patch, but also helped manage diseases like summer patch, crown-rotting anthracnose and take-all patch. Heritage also contributed to improving turfgrass quality and preventing Summer Stress Syndrome.

These programs on greens proved so successful in improving turfgrass quality and preventing Summer Stress Syndrome that superintendents wanted to adapt them to fairways. The problem, however, was price.

**Program for Greens**

- Chipco Signature plus Daconil Ultrex or
- Chipco Signature plus Chipco 26 GT or
- Chipco Signature plus Fore

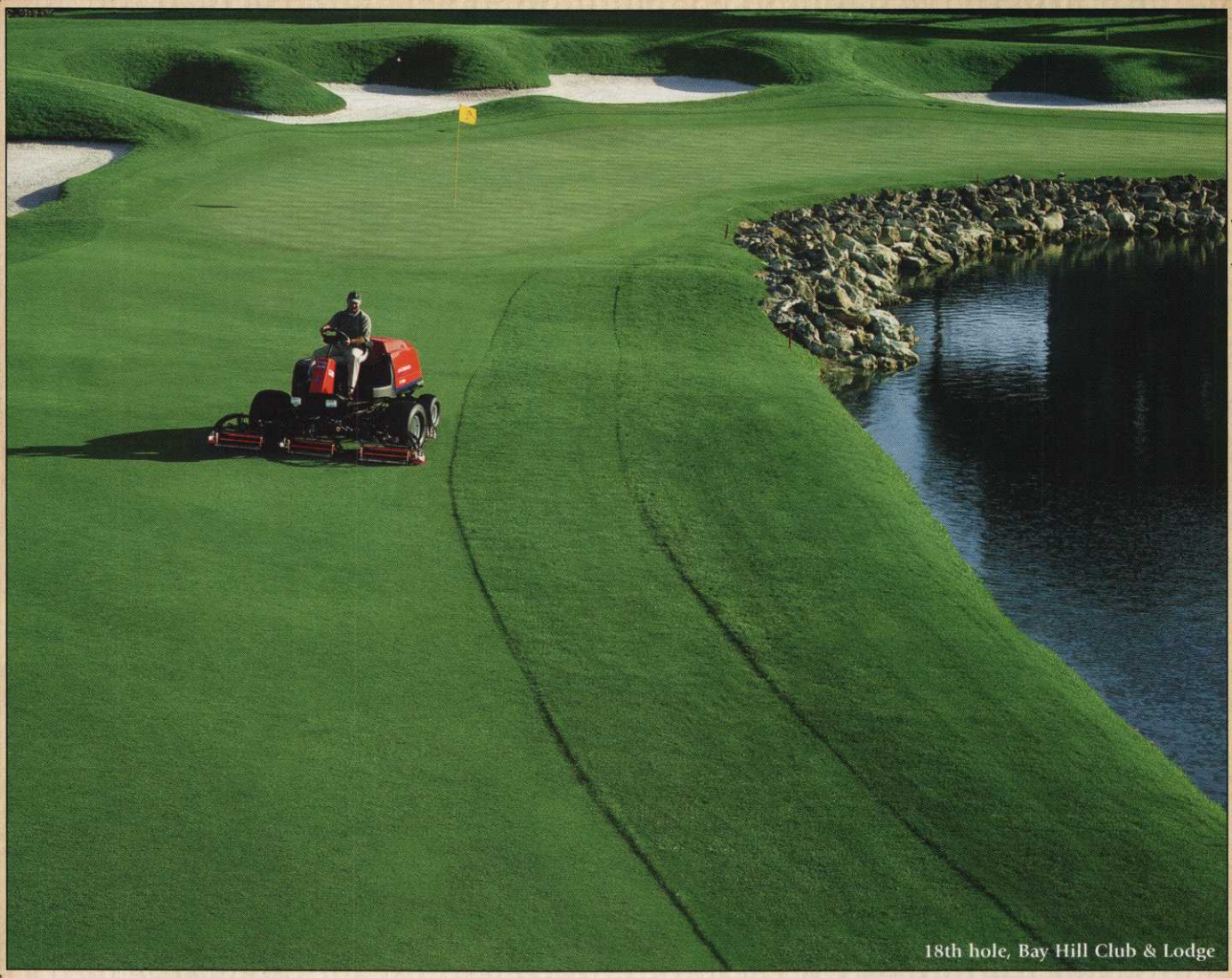
**Program for Fairways**

- Nutri Grow P+K plus Daconil Ultrex or
- Nutri Grow P+K plus Chipco 26 GT or
- MPK plus Daconil Ultrex or
- MPK plus Chipco 26 GT

Though the program is affordable on greens, it was not affordable on fairways. Researchers looked at products similar to Chipco Signature for improving turfgrass quality in creeping bentgrass and annual bluegrass fairways. Two that they looked at in combination with Daconil Ultrex were Nutri Grow P+K and MKP (monopotassium phosphate). They both improved the quality of the turf in the fairways. Other diseases, however, attack creeping bentgrass and annual bluegrass fairways, so additional fungicides will have to be used. But the improvement in quality should be well worth the application of Daconil Ultrex in combination with either Nutri Grow P+K or MPK.

The success of this program depends on applying the products before the arrival of warm weather. If the products aren't applied in the cool weather, they won't work. If you wait until the turf is under stress, it's too late to apply them. They need to be applied in the cool weather to make the plant healthier going into the summer stress period to prevent Summer Stress Syndrome.

*J. M. Vargas Jr. is a professor in the Department of Plant Pathology at Michigan State University, East Lansing, Mich.*



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CIRCLE NO. 139

# Does Aerification Help Solve Compaction Problems?

*By Beth Guertal and Dave Han*

The effects of traffic and compaction on turf are usually easy to see — thin turf, worn paths and areas of bare ground that do not respond to applications of fertilizer or water. Turfgrass growing in compacted areas has shallow rooting, poor water utilization and greater susceptibility to stress. The soil in compacted areas has low air porosity and reduced infiltration.

Such compaction is most likely to occur in fine-textured soils (i.e., those with higher clay content), but all soils may be susceptible to compaction over time.

Turf managers know one key to correcting soil compaction in turf is aerification, which is performed using equipment that drills, slices, spikes, punches or water-injects the turf and its underlying soil to various depths. Sometimes the equipment removes a plug of turf, and sometimes it only cuts a slit or punches a hole. With some equipment, there is the additional benefit of thatch control, as slicing or core removal also removes some thatch. Most turf managers have a piece of aerification equipment.

Research has shown that double-ring infiltrometers with an inside ring diameter of at least 12 inches produce the most accurate measurements of water infiltration.

Given that turf aerification is common, you might think a great deal of research evaluating different equipment (and variables such as aerification frequency and depth) has been done. That's a mistake.

Factors affecting aerification are many, including soil moisture, tine size, depth of aerification, soil texture, aerification frequency and equipment type. Therefore, compaction research is difficult because it requires large plots, uniform areas of compacted (and non-compacted) turf, and several different pieces of equipment.

Additionally, data collected to show treatment differences is often difficult to obtain, requiring intensive sampling. Typical data collected from compaction studies may include soil bulk density, soil penetrometer resistance, surface hardness, water infiltration, shoot density and root length or weight. The objective of this article is to provide some explanation about the type of data collected in turf-compaction experiments. It will also discuss some of the turfgrass compaction research that has been conducted.

## What the experiments measure:

**Soil bulk density:** Bulk density is defined as the mass of a unit volume of dry soil. To collect a bulk-density reading, a known depth and diameter of soil (typically 6 inches deep and 3 inches in diameter) is removed. The soil sample is then dried, and the bulk density is expressed as the mass per volume (grams per cubic centimeter). As the soil is compacted, bulk density will increase because soil pore space will be reduced.

Sandy soils typically have a higher bulk density than soils high in clay or loam because sandy soils have few tiny pores associated with fine-textured soils that have clay and organic matter. Additionally, sandy soils that contain sand in a range of sizes (as is a typically sand-based putting green) are already tightly packed, as smaller sand grains fit in between larger ones.

Typical bulk densities for clay and silt loam soils may range from 1 gram per cubic centimeter ($g/cm^3$) to 1.5 $g/cm^3$, while the bulk density of sand-based soils may range from 1.3 $g/cm^3$ to 1.8 $g/cm^3$. At the upper end of these ranges, the bulk density may inhibit root penetration. In comparison, the USGA recommendation for bulk density of putting greens mix is 1.2 $g/cm^3$ to 1.6 $g/cm^3$. Also, bulk density is highly variable from location to location, and one sample will usually not be an indicator of the bulk density of an entire field or turf area.

**Soil penetrometer readings:** A soil penetrometer is a device used to measure the compaction of the soil.

What is actually measured is the resis-

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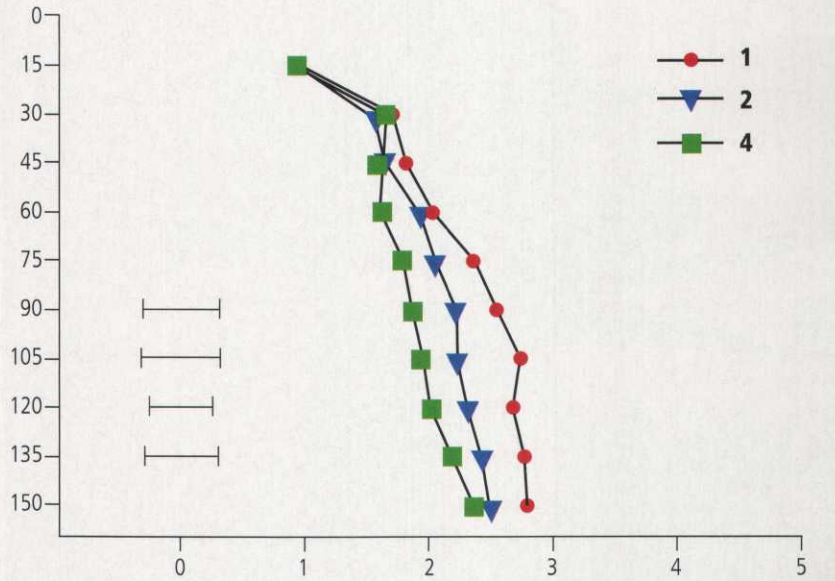
**CIRCLE NO. 140**

**TABLE 1**

Soil resistance in a heavily trafficked hybrid bermudagrass athletic field as affected by frequency of core aerification, July 1999, Auburn, Ala. Depth is 0 to 6 inches. Legend indicates the number of core aerifications applied in one year. Horizontal bars indicate significant differences at those depths.




tance, or amount of pressure, needed to push a tipped rod through the soil. The rod tip is equipped with a load-sensing cell to record the soil strength as it varies throughout the soil depth. Soil penetrometers used for research are extremely sensitive and require some practice to use correctly. They are also expensive, costing as much as $6,000.

**Hydraulic conductivity**: Hydraulic conductivity is the ease with which soil transmits water. In turfgrass, what we often measure is the saturated hydraulic conductivity, which occurs when all soil pores are filled with water.

## Turf aerification research is rather scarce, probably because it is very difficult to do.

Saturated hydraulic conductivity is typically measured using a double-ring infiltrometer, which consists of two metal rings (one around 12 inches in diameter and the other around 18 inches), with the smaller placed inside the larger. Water is added to both rings until a height of water is maintained for a period of time, which indicates that the underlying soil is saturated.

The drop in the height of water inside the smaller ring during a given period is used to calculate the saturated hydraulic conductivity, which is reported in units such as inches per hour.

Small-diameter (6-inch) infiltrometers can be purchased by turfgrass managers in many turf supply catalogs. The intended use of these units is to provide turf managers with infiltration rates quickly.

Since research has shown that double-ring infiltrometers with an inside ring diameter of at least 12 inches produce the most accurate measurements of water infiltration, the accuracy of 6-inch-diameter rings was a concern.

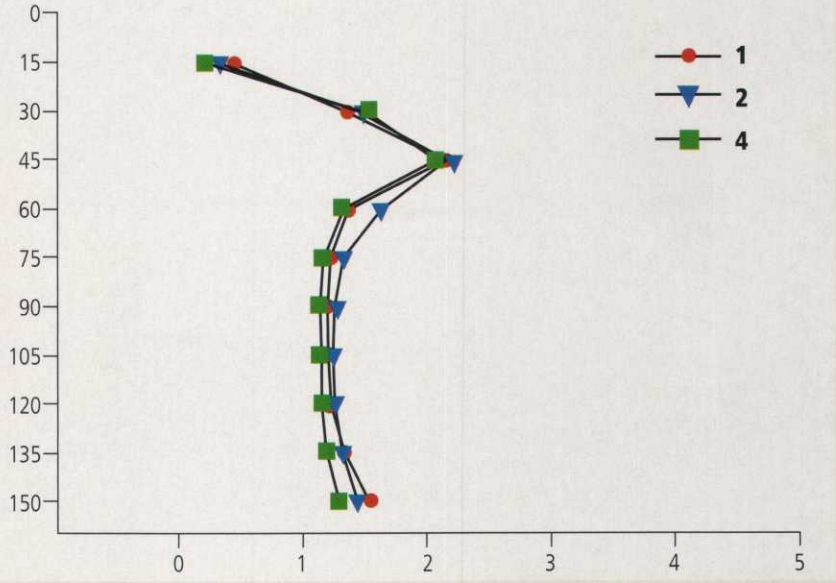
A 1991 research study by D.H. Taylor compared single- and double-ring infiltrometers with inner-ring diameters of 6, 8 and 12 inches on a variety of turf areas, from golf greens to football fields. Taylor found that infiltration rates varied widely within each sampled turf area, even when the largest diameter rings were used. Taylor concluded that infiltration rates measured with standing water should be used only as a rough estimate, and results should be used with caution (Taylor et al., 1991).

**Clegg impact readings:** Typically used to measure the hardness of a turf surface, the Clegg hammer calculates the hardness of a surface based on its reaction to a weight dropped on the surface from a consistent height.

A diagnostic tool for discovering differ-

**TABLE 2**

Soil resistance in a lightly trafficked hybrid bermudagrass athletic field as affected by frequency of core aerification, July 1999, Auburn, Ala. Depth is 0 to 6 inches. Legend indicates the number of core aerifications applied in one year. Absence of horizontal bars indicates no significant differences between treatments.




ences in surface hardness due to aerification, work has also started using Clegg hammer readings to measure field hardness or softness. The Clegg hammer uses an accelerometer attached to a weight where the maximum deceleration of the impact is measured. The units for such measurements are $g_{max}$.

For example, a survey of 24 high school athletic fields had Clegg values that ranged from 33$g_{max}$ to 167 $g_{max}$ (Rogers et al., 1988).

In another study, compacted Kentucky bluegrass plots had a value of 206 $g_{max}$ while plots that were not compacted had a value of 93 $g_{max}$ (Rogers and Waddington, 1992).

A survey of college and professional soccer players was used to compare their perceptions of soccer fields that had been used to collect Clegg data. Typically, fields with a hardness reading between 90$g_{max}$ and 120 $g_{max}$ generally could not be differentiated by players (Miller, 1999). As comparison, a tiled concrete basement floor had a $g_{max}$ reading of 1,280, which was reduced to 260 $g_{max}$ when the floor was covered with a carpet pad (Rogers et al., 1988).

## The research

The earliest aerification research was usually conducted as a part of a thatch management study using bermudagrass putting greens. In these studies, aerification tines were usually small in diameter (one-quarter to 2 inches) and did not penetrate deeply into the soil (2 to 3 inches). Frequency of core aerification ranged from biweekly to twice yearly (Smith, 1979; White and Dickens, 1984).

The focus of both these studies was to explore the impact of treatments such as fertilizer source, vertical mowing, topdressing and aerification on thatch depth, not soil compaction. Therefore, direct measurement of soil variables such as bulk density or soil resistance are missing from these studies.

**Care should be taken to avoid creation of a compaction pan, which might be caused by aerifying at the same depth for a long period of time.**

In one study, increasing aerification from twice yearly to once monthly did not affect thatch depth (White and Dickens, 1984). In another study, however, increasing aerification from twice yearly to monthly slightly decreased thatch depth (Smith, 1979).

One study recognized that most turfgrass cultivation research evaluated thatch removal, so it focused instead on the effects of core cul-

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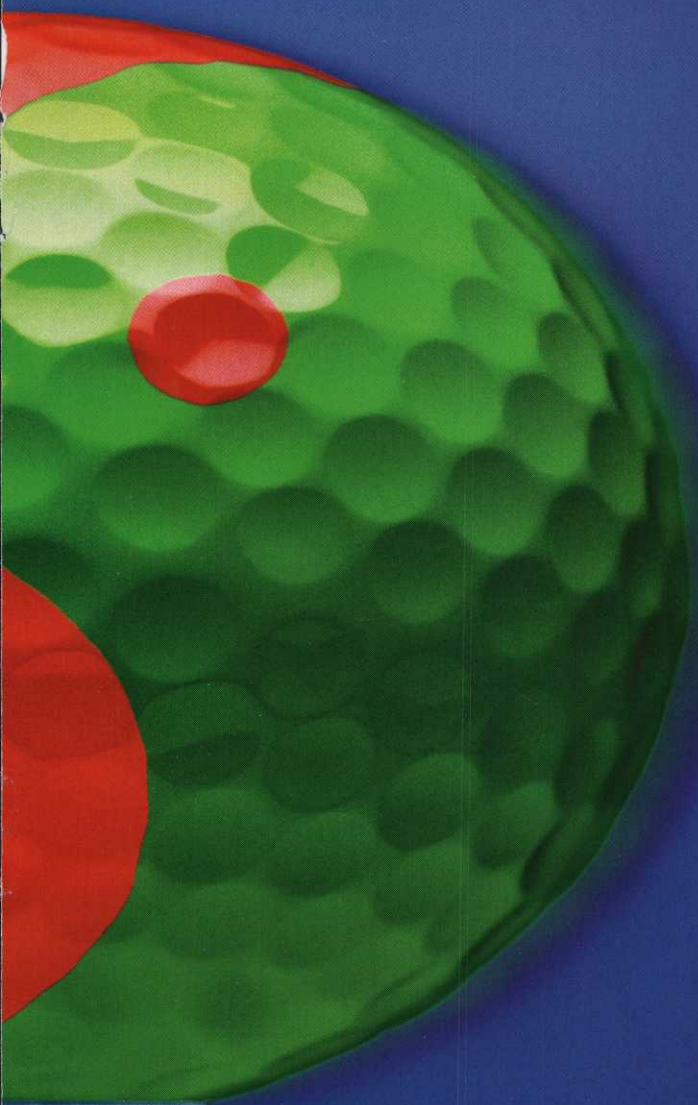

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CIRCLE NO. 138

tivation on saturated hydraulic conductivity, porosity and penetration resistance (Murphy et al., 1993). In this study, bentgrass putting greens were treated with hollow or solid aerification tines. There were an equal number of compacted and non-compacted greens, and the soils were a mixture of moist or wet soils when the cultivation treatments were applied.

Compaction of the turf soil reduced the percentage of macropores in the soil, which are the larger pores from which water drains quickly, leaving air spaces in the soil. Reductions in macropore volume can lead to soils that do not drain well and have reduced air movement.

**The lightly compacted site needed only one aerification in a given year to produce a significant reduction in soil resistance.**

In fixing the compacted soils, the use of hollow tines was more effective than solid in creating macropores. Any type of aerification (hollow or solid) increased soil porosity in compacted soil. In the non-compacted plots, aerification had no effect.

Compaction increased the soil resistance, as measured by the pressure required to push a soil penetrometer through the soil. Reductions in soil compaction were obvious one week after aerification, and the effects lasted nearly three weeks. After three weeks, the plots that had been aerified with hollow tines were less compacted than those aerified with solid tines.

The authors concluded that routine cultivation is needed to prevent soil compaction, especially if solid tines are used. However, care is needed to avoid the development of a compacted layer at the end of the aerification depth. Aerification at different depths should help prevent development of a cultivation pan at some lower depth (Murphy et al., 1993).

Research at Auburn University also found that aerification was less likely to have an effect when soils where noncompacted, as compared to soils that are compacted. The tables illustrate soil penetrometer readings over a 6-inch depth taken from two different hybrid bermudagrass athletic fields with similar soil types.

One field (Table 1) was heavily compacted, while the other (Table 2) only received traffic from equipment and occasional foot traffic. The tables illustrate soil penetrometer readings taken after a different number of hollow-tine (8 inches deep, three-quarter-inch diameter) core aerifications had taken place. Plots were aerified either one time (July), twice (July and October) or four (July, October, January, April) times a year.

At the heavily trafficked site, every additional core aerification in a given year decreased soil resistance. This was not the case at the lightly compacted site, and only one aerification was need in a given year to produce a significant reduction in soil resistance.

At the heavily trafficked site, the effects of deep-tine aerification usually lasted about three weeks. This supports the conclusions of previous work that frequent aerification might be needed on compacted sites. Again, however, care should be taken to avoid a compaction pan at the bottom of the tine working depth.

In conclusion, here's what we do know about the relationship between compaction and aerification of turfgrass soils:

- Compaction of turfgrass soils lowers the percentage of macropores in the soil. A decrease in macropores limits soil aeration, which hurts root growth.
- Core aerification, especially solid tine, may not help eliminate thatch.
- The effects of aerification, especially in heavily trafficked soils, may be short-lived (about one month).
- Diagnostic techniques for detecting compacted soils, such as infiltration measurements or soil penetrometer readings, are widely variable, even across supposedly uniform surfaces such as a putting green.
- Care should be taken to avoid creation of a compaction pan, which might be caused by aerifying at the same depth for a long period.

*Beth Guertal is alumna associate professor of agronomy and soils at Auburn University, Auburn, Ala. Dave Han is an assistant professor in the department. They can be reached at eguertal@acesag.auburn.edu or dhan@acesag.auburn.edu.*

# Choose Kentucky Bluegrass Types to Develop Improved Blends

*By Stacy A. Bonos, James A. Murphy and William A. Meyer*

Kentucky bluegrass (*Poa pratensis* L.) is the most widely used cool-season turfgrass in the United States. The popularity of Kentucky bluegrass is due to its ability to develop dense turfs of pleasing color and clean mowing quality. Its extensive rhizome system provides the ability to recuperate after stress periods and fill in damaged areas.

Since Kentucky bluegrass reproduces through an asexual process called apomixis, improvement in cultivar performance is challenging. However, apomixis also provides the opportunity to produce true-to-type seed from superior plants generation after generation.

Over the past several decades, more than 200 cultivars of Kentucky bluegrass have been released. Kentucky bluegrass cultivars have been developed through a number of approaches including: selection of naturalized ecotypes; selection of successful, highly apomictic plants found in old pastures or turfs, and selection of single, highly apomictic plants from breeding programs using intra- and interspecific hybridization.

Turfgrass breeders have traveled throughout the United States and the world collecting Kentucky bluegrasses that have persisted under a range of environmental conditions. Many genotypes have been identified that vary dramatically in disease resistance, stress tolerance and growth habit. As expected, many of the Kentucky bluegrass genotypes are best adapted to regions that are climatically similar to their site of collection. Thus, Kentucky bluegrass plants can be classified based on climatic region of adaptation as well as growth habit and turf performance.

More recently, with improved breeding techniques (Pepin and Funk, 1971), hybrids can be developed successfully, and the genetic background of the parents may also be useful in classification.

Kentucky bluegrasses are classified into three general categories: Elite turf types, BVMG turf types and common type. Prior to the release of Merion in 1947, common-type Kentucky bluegrasses (Category III) were the predominant type used for turf.

The common-type bluegrasses perform best under low-maintenance conditions, but are highly susceptible to leaf spot caused by *Drechslera poae* (Baudys) and melting-out disease caused by *Bipolaris sorokiniana* (Sacc. In Sorok), particularly under higher maintenance situations.

Merion, discovered by Joseph Valentine in the early 1930s, was resistant to leaf spot disease and greatly increased the usefulness of Kentucky bluegrasses in regions with a humid, temperate climate.

Turf-type Kentucky bluegrasses (Categories I and II) have a lower, more prostrate growth habit, respond well to higher management inputs, tolerate closer mowing and have greater resistance to leaf spot disease than common-type bluegrasses.

The main classification types in Categories I and II include Compact, Julia, Bellevue, Mid-Atlantic, Aggressive, Shamrock types and BVMG (named after Baron, Victa, Merit and Gnome) (Bara et al., 1993). It should be noted that this classification system continues to be refined as more cultivars are developed and their distinct turf characteristics are expressed in research trials.

## Category 1

**Compact type.** Cultivars within this group are characterized by low, compact growth (Bonos et al., 2000) and possess good to excellent resistance to leaf spot disease (Murphy et al., 1997).

Many cultivars can form a highly attractive turf after green-up in late spring, with some cultivars producing excellent turf quality. Top performers in New Jersey turf trials are Moonlight, Princeton P-105, Blackstone, Langara and Blacksburg. Generally, these cultivars exhibit good resistance to stripe smut disease (*Ustilago striiformis*), have long winter dormancy and a purple coloration during cold weather. Black-

stone tends to exhibit better winter performance than most other cultivars in this group. Performance during summer heat and drought stress is variable.

Due to the low, compact growth habit, cultivars within the compact type may be the most suitable for fairways, especially in areas where Kentucky bluegrass thrives — climates with bright sun, low humidity and cool nights.

**Compact-Midnight type.** Within the compact type, a number of cultivars exhibit similar growth and performance characteristics to the cultivar Midnight. They have long winter dormancy with late-spring green-up. These cultivars characteristically have a dark green color with good to excellent turf quality and good heat tolerance. These cultivars are susceptible to powdery mildew (*Erisyphae graminis*), so use in shaded areas should be limited.

Many of these cultivars have good resistance to summer patch disease (*Magnaporthae poae*), an important disease at low cutting heights.

**Compact-America type.** Within the compact type, a number of cultivars exhibit similar growth and performance to the cultivar America. These cultivars have finer leaf texture and higher density than other compact-type cultivars. They have moderate winter dormancy and, unlike the Compact-Midnight type, have good resistance to powdery mildew.

**Julia type.** This group of cultivars exhibits similar growth and performance characteristics to the cultivar Julia. This group of cultivars has a medium-low growth habit and can form highly attractive turf. They have moderate winter performance, good resistance to leaf spot and stripe smut, but can be damaged by dollar spot (*Sclerotinia homoeocarpa*) and brown patch (*Rhizoctonia solani*) diseases.

**Bellevue type.** These cultivars form a turf with medium growth, medium-wide leaves and medium-shoot density (Bonos, et al., 2000). This group characteristically exhibits excellent cool-season vigor, which is evident by excellent color retention and turf quality during the winter, and early spring green-up.

Cultivars within this group can become stemmy in turf plots from seedhead formation in late spring. This group of cultivars exhibits some susceptibility to billbug feeding.

**Mid-Atlantic ecotype.** This group of cultivars forms a vigorous turf of medium density with a deep, extensive root and rhizome system. In general, this group has moderate susceptibility to leaf spot disease; an exception is SR 2000, which has good resistance.

The ability to recover from leaf spot damage and other stresses is excellent and results from the deep, extensive rhizome system. This type exhibited good tolerance of summer stress (Bonos and Murphy, 1999) without supplemental irrigation under New Jersey conditions. This group has moderate to good winter performance. The cultivar Eagleton has shown repeatedly in New Jersey turf trials to be resistant to billbug (*Stenophourous spp.*) feeding, which is a serious and often misdiagnosed problem on many Kentucky bluegrass turfs in the Northeast.

The Mid-Atlantic ecotype would be a good component of low- to moderate-maintenance seed blends and mixtures. It would perform well on golf course roughs because of its medium density, and ability to maintain active green growth during extended drought and heat-stress periods.

**Aggressive type.** This group of cultivars shares two common characteristics: aggressive lateral growth and a turf with high shoot density. An aggressive, dense growth may be advantageous for highly trafficked turfs and can hasten the development of a mature sod. Aggressive cultivars can dominate other cultivars or species when used in blends or mixtures.

If aggressive cultivars dominate a stand, this could lead to the rapid expression of the cultivar's strengths or weaknesses. Other turf characteristics are variable within this group (Bonos et al, 2000; Murphy et al., 1997).

**Shamrock type.** Cultivars within this type exhibit characteristics similar to the cultivar, Shamrock. These cultivars exhibit good leaf spot resistance, moderate winter performance and are susceptible to billbug feeding. They have the potential for high seed yield. Compared to the BVMG type, Shamrock-type cultivars have less seedhead formation in turf plots and show better resistance to stripe smut disease, although SR 2100 is susceptible.

**Other type.** This preliminary grouping of cultivars and selections possess characteristics intermediate between two or more previously described groups. Further study is needed to identify new classification groups of cultivars or determine specific characteristics common to a known group.

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CIRCLE NO. 141

## Category II

**BVMG type** *(Baron, Victa, Merit, Gnome type).* This widely used group of cultivars has high seed yield potential and can generally produce medium-good quality turf in the absence of stripe smut disease.

These cultivars have medium-low growth, medium-wide leaves, and produce a medium-density turf. They can become stemmy in mowed turf plots from seedhead formation in late spring. The BVMG type has moderate resistance to leaf spot disease, but entries evaluated in long-term trials in New Jersey are susceptible to a new strain of stripe smut disease.

Dragon shows better resistance to stripe smut disease than other cultivars. They generally have poor winter color, long winter dormancy and can suffer significant billbug damage. This type isn't recommended for golf courses because of its stripe smut susceptibility.

## Category III

Common type (formerly Midwest Ecotypes). These cultivars and selections, frequently referred to as "common" Kentucky bluegrass, have an erect growth habit and narrow leaf blades (Bonos et al., 2000). Common-type Kentucky bluegrasses are useful for conservation purposes, permanent pastures and low-maintenance utility turf, which makes them a candidate for naturalized or infrequently mowed areas on large-acreage commercial and residential turfs, and golf courses.

Many of these cultivars were selections of naturalized ecotypes found in old pastures of the midwestern United States. They produce seed early and economically, exhibit good stress tolerance and often survive summer drought in a dormant condition. However, these common-type bluegrasses can suffer severe turf loss from leaf spot and melting-out disease under conditions of close mowing in humid environments.

A few experimental selections do show improved leaf spot resistance in New Jersey turf trials.



## Summary

Kentucky bluegrasses have many uses on athletic fields, home lawns and golf courses, including roughs, naturalized areas and some potential for fairways and tees.

The compact-type cultivars, including the Midnight and America types, have the greatest potential for low-mowing tolerance. Low-mowing tolerance will be greatest in regions with bright sun, low humidity and cool nights. The aggressive-type cultivars have the greatest potential for highly trafficked turfs and athletic field situations. The Mid-Atlantic-type has the greatest potential for golf course roughs, higher-cut home lawns and areas prone to drought stress in the Northeast.

Blends of three or more Kentucky bluegrass cultivars should be used for optimum performance. Blends for surrounds, roughs or fairways should include elite cultivars from Category I that are similar in appearance, leaf texture and color, but more diversified in environmental stress and pest tolerance. Combining the diverse strengths of more than one Kentucky bluegrass cultivar will optimize adaptability of the turf blend or mixture.

Turf managers should evaluate the results of NTEP trials conducted under climatic conditions similar to their regions for the most accurate evaluation of cultivars. Considerably more improvement is needed for low-mowing tolerance, summer-patch resistance, annual bluegrass competition and quicker establishment before Kentucky bluegrass is used to its fullest potential.

*Stacy A. Bonos is an assistant professor of turfgrass breeding at Rutgers University. James A. Murphy is an associate professor and extension specialist in turfgrass management at Rutgers University. William A. Meyer is a research professor and director of the Turfgrass Breeding Program at Rutgers. The authors have been working on the classification of Kentucky bluegrass for the past six, 10 and 27 years, respectively.*

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# Zero Maintenance Could Equal Major Cost for Zero-turn Mowers

*By Roy Dust*

A growing segment of the commercial mower industry is the zero-turn mowers, featuring machines that are highly maneuverable, compact in design and considered to be among the most productive equipment available.

These machines can only perform at their peak, however, if they're properly maintained. We'll examine how best to maintain these machines over the course of a season.

## PRESEASON

If the unit was properly stored during the off-season, the following steps should be followed:

- Remove the blocking and all protective coverings.
- Install the battery (check and charge it as needed).
- Check the exhaust outlet and air cleaner because these are favorite sites for bees and rodents to nest.
- Fill the fuel tank with fresh gas of the proper octane. Too high an octane is bad for the valve train.
- Service the engine using the engine manufacturer's recommendations.
- Check engine oil level and look for signs of condensation contamination. Brown, milky-looking oil is not normal. If necessary, drain, refill and change the oil filter.
- Check all tire pressures and other fluid levels.
- Start the engine outside or in a well-ventilated area, running at slow revolutions per minute until warm, and check safety circuits for proper operation.

## IN SEASON

Proper daily maintenance should become second nature. It's the most important step you can take to ensure the peak performance of the equipment.

Before starting the unit each day you need to:

- Check the engine oil level.
- Look at tire pressures. Overinflation reduces traction, creates a harsh ride and increases tire failure. Underinflation can damage both the turf and tire. It also can lead to poor cutting performance.
- Inspect the machine visually, paying particular attention to loose nuts or bolts, belt tension(s), loose or frayed wiring and overall appearance.
- Clean the deck as needed. It should also be inspected for signs of damage or wear.
- Check the blades for tightness. Sharpen or replace them as needed.
- Check all shields and guards to be sure they are in place and secure.
- Start the machine and check that all safety systems are working properly.

In addition to the daily maintenance, all mower and engine manufacturers have recommended normal maintenance schedules and these should be heeded. In general, a normal maintenance often consists of the following instructions:

- Change the engine's oil and filter.
- Clean and replace the air filter element (use of compressed air to blow out filter elements is not recommended by most manufacturers).
- Lubricate all pivot points and bearings as required. This area is one of the most misunderstood, with too many people either neglecting to grease on schedule, using the wrong

***Disconnect the battery and store in a cool, dry place in the off-season.***

*Inspect spindles and pulleys, paying particular attention to bearings, belt conditions and tensions.*

grease (all grease is not the same) and, in some cases, overgreasing.

• Check and service all fluids (hydraulics and liquid-cooled systems when applicable). Fuel filters and sediment bowls are often forgotten.

• Check mower decks for cracking and debris build up.

• Inspect spindles and pulleys. Pay particular attention to bearings, belt conditions and tensions.

**When properly cared for, the zero-turn mower can provide many hours of reliable, quality service.**

• Inspect the battery for corrosion and proper fluid levels if not sealed.

• Examine the spark plugs. Reset or replace them regularly to maintain maximum horsepower and fuel efficiency.

## POST SEASON

Taking the time to prepare your units for off-season storage can pay dividends over the long haul and will make spring start-up less troublesome. The best procedures for your individual machines will be outlined in your owner's manuals.

Generally, most machines will need at least the following steps to insure proper storage:

• Drain crankcase oil while engine is hot and refill.

• Prepare the mower deck by cleaning and either painting or coating all bare metal with a thin layer of oil.

• Clean all external surfaces and the engine.

• Prepare the engine according to the manufacturer's instructions. This will generally include:

a) Removing dirt or debris from engine cylinder heads, blower housing and air filter element.

b) Covering air cleaner and exhaust element to prevent invasion by unwanted insects or rodents;

c) Greasing and oiling completely, per manufacturer guidelines.

d) Painting or applying rust preventative to any areas where paint has worn or chipped off.

e) Being sure the battery is fully charged and filled.

f) Removing the battery from the machine and storing in a cool, dry place is highly recommended. At minimum, the cables should be disconnected from the battery terminals.

g) Draining the fuel system completely and running the machine dry or adding a gasoline stabilizer to the fuel is the final step. Run the engine long enough for the mixture to reach the filter and carburetor.

When properly cared for, the zero-turn mower can provide many hours of reliable, quality service.

*Dust is a product specialist for Munnsville, N.Y.-based Ferris Industries.*

# Busting the Myths Surrounding The First Tee

## Misconceptions abound about the program, what it does and what it plans for the future

**BY JOE O'BRIEN**

As I've traveled across the country promoting The First Tee program, I often encounter myths about what the organization is and does. The myths gain currency because of the word-of-mouth popularity of the program and its continued evolution.

I believe these myths impair the program's growth, so I've developed answers to the 10 most damaging ones to dispel them:

**1. The First Tee program adds to the oversupply of golf courses while new golfer participation is flat.**
This is by far the most damaging myth. Out of 85 operating First Tee facilities, existing golf courses host 41 of them. We've only added two 18-hole courses in the past four years. Most of our facilities have three, six or nine holes — hardly the type of operation that would seriously compete with the bread-and-butter of our industry, the 18-hole golf course.

**2. There is a distinct look to a First Tee facility.**
I could drive you to 20 First Tee facilities, and you wouldn't know from looking at them that there was any physical-identity connection between them. The First Tee is not a franchise (like McDonald's or Marriott), which means we can adapt our program to individual facilities. After all, it's the experience for the kids that's important, not the packaging.

**3. The First Tee is a program for inner-city youth.**
The First Tee is, primarily, a program designed to provide affordable, accessible golf for all kids, regardless of background. While it's true that many of our facilities are located in urban areas, The First Tee also sees opportunity in rural areas and suburban areas. We want to bring the game of golf to kids who wouldn't normally have the opportunity to play.

**4. The First Tee works in isolation.**
Every First Tee chapter is a collaborative community effort with local youth organizations, park districts, schools, foundations and others with a view toward bringing kids in contact with golf. The program wants its facilities to be models of public/private partnerships.

**5. The First Tee is primarily dedicated to creating the next Tiger Woods.**
We at The First Tee strive to introduce the game of golf to as many kids as possible, but for reasons other than creating professional golfers. Instead, The First Tee believes golf teaches lessons for life, such as the importance of rules and setting goals. It also develops values such as honesty, sportsmanship, respect, courtesy, judgement, confidence, perseverance and responsibility.

**6. The First Tee program can only be taught by golf professionals.**
Golf is only a means to an end, so it doesn't require people with the most golf skills to teach the life skills. We want people who instruct at The First Tee's facilities to possess two important qualities: a love of golf and a love of kids. We want people who can teach kids about the importance of networking and other skills that will help them later as they enter the workforce. Of course, qualified PGA and LPGA professionals must teach the grip, stance and swing elements of the game, and amateurs must be careful not to violate the rules of their amateur status.

**7. The First Tee is focused on junior golfer retention.**
Of course, The First Tee is concerned that the number of golfers has remained flat over the last three years. As concerned as we are, however, we are equally focused on how golf improves the academics, self-esteem and core values of children. We hope they will grow to love the game and the life skills it teaches so they will stay golfers for life, but this is not the focus of our program.

**8. All First Tee facilities are struggling financially.**
Some of our newer and larger facilities face the same economic hurdles that all golf facilities face, but we don't have facilities in danger of failing. In fact, several of our programs are doing quite well and are operating within their budgets. The fact that The First Tee is a 501c(3) corporation allows additional revenue opportunities unavailable to for-profit operations. Our funding model is more like other charity-based youth organizations.

**9. The First Tee facilities are required to support themselves with a traditional golf-business model.**
As a charitable organization, we operate as a nonprofit, so we can depend on community support for funding to supplement user fees. Each facility is managed by a board of volunteers, who work hard to raise money from the community, often taking advantage of co-marketing opportunities at golf tournaments. The rules that govern fundraising for The First Tee are no different from those that govern any other charitable organization.

**10. The First Tee experience must revolve solely around a golf facility.**
In fact, many of our boards of volunteers do much of their programming off-site as well as on-site. They can take the golf instruction right to the schools. In addition, I know of First Tee chapters that are involved in community projects as well. It's true that the centerpiece of any First Tee golf activity is a golf course, but the program can reach well beyond the boundaries of the home facility.

I hope I've clarified what being a member of The First Tee is all about. The First Tee is still a young organization, and its role will evolve in support of our mission. We really run our business with three watchwords in mind: We seek to have an impact on youth, partner with constituents, and develop facilities and people.

We look forward to working with everyone in the golf industry to refine our programs so we can do what's in the best interests of the game — and the kids.■

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*O'Brien is senior managing director for operations of The First Tee.*

BY FRANK H. ANDORKA JR., MANAGING EDITOR

# MAXIMUM CONTROL

## Slow-release products can enhance your turf maintenance practices – if you know how to use them

Kevin Goolsby, superintendent at Sportsman of Perdido Golf Resort in Pensacola, Fla., tried many nitrogen sources to manage his newly seeded seashore paspalum course — 22, to be exact.

It wasn't because Goolsby couldn't settle on one product. Researchers used his course as a test plot to monitor the effectiveness of a variety of nitrogen sources. As the research ended, one type of product stood out from the rest for Goolsby's course.

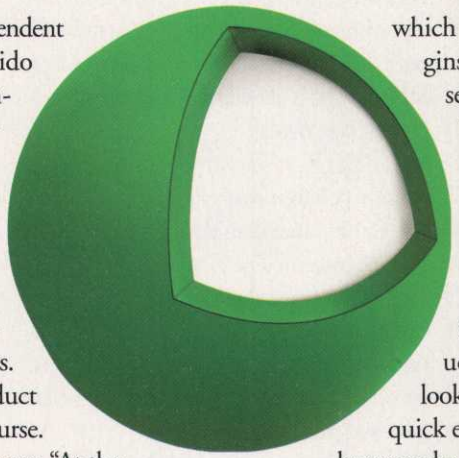

ILLUSTRATION COURTESY OF PURSELL TECHNOLOGIES

"You name it, we tried it," Goolsby says. "At the end of our experiments, though, we kept coming to the same conclusion: Slow-release products work best for our course."

This year, Goolsby intends to use slow-release fertilizers exclusively. He says the product acts as a low-cost way of spoon-feeding his turf the nutrients it needs.

Slow-release products work differently than traditional chemicals, so you can't think about them in the same way. Proponents of slow-release products, like Goolsby, cite advantages such as lower overall environmental impact, fewer applications and longer residual impact on turf. Without proper understanding and application, however, these advantages can be lost.

### How they work

Slow-release products work by releasing chemicals in small amounts over time0, according to Jeff Higgins, director of market development for Pursell Technologies. Therefore, the residual effects last longer, leach less and allow for fewer applications. Temperature, moisture and microbes, combined with the thickness of the coating, are among the factors that will affect the speed with which the chemicals release, Higgins says. The exact method of release varies from product to product.

"It takes a little time to understand how they work and which products will work best for you," Higgins says. "It all starts with educating yourself about what results you're looking for. There's probably a product out there that will get you those results."

### Things you need to know

Goolsby says superintendents should pinpoint the problems they need to solve before deciding to use a slow-release product. For example, if superintendents are looking for rapid green-up from a fertilizer or quick eradication from an insecticide, slow-release products won't help them, says Rick Brandenburg, a professor of entomology at North Carolina State University. Brandenburg researched Pursell's new slow-release insecticide, Precise (*see sidebar on page 60*).

"You're not going to use a slow-release product in a rescue situation because you're not getting the full force of the product immediately," Brandenburg says. "That's why it's so important to understand what you're combating."

Once superintendents have determined what they want the products to do, they should research products carefully, says Jimmy Thomas, certified superintendent at the Hyatt Regency Hill CC in San Antonio. He recommends they pay attention to what causes the coatings to break down.

"If a product requires microbes to break down, for example, you'd better ensure the proper microbes are in your soil," Thomas says. "Otherwise, you'll be wasting your time and money."

Thomas also warns superintendents to handle slow-release products carefully. If they break the outer coatings, they'll lose their slow-release capabilities. Goolsby also says superintendents should make sure they store the products in dry places to avoid having water pierce the coating prematurely.

*Continued on page 60*

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*Continued from page 58*

### How to apply them

**Jimmy Thomas, certified superintendent at the Hyatt Regency Hill CC in San Antonio, says slow-release products provide long-term, one-application spoonfeeding.**

Pursell's Higgins says superintendents must also calculate their application rate accurately. The ratios are not the same as they would be for traditional products, so it's imperative that they understand how to calculate the dose.

"The reason you're putting these products on your course is to extend their efficacy, so if you're not careful with the dosing it defeats the whole purpose," Higgins says. "I've heard stories about superintendents who have problems with the products, only to discover later they've put down too much or too little product."

Superintendents should apply most coated fertilizers at 2 pounds per thousand square feet; in contrast, regular nitrogen-fertilizer rates are 1 pound per thousand square feet. It often takes superintendents time to understand the different ratios, Higgins says.

**Jeff Higgins, director of market development for Pursell Technologies, says if you're not careful with dosing slow-release products, it defeats their purpose.**

"It may seem like controlled-release products aren't worth the additional price up-front, but the residual effects make them more cost-effective," Higgins says. "You can get eight weeks to 10 weeks of coverage with traditional fertilizers. With slow-release products, you can get efficacy that lasts from 24 to 36 weeks."

Once you've determined the dose, it's time to calibrate your spreader appropriately to make sure you're putting down the amount you think you are, Goolsby says. "There's nothing more embarrassing than putting down a fertilizer unevenly and then seeing a tiger-striping effect after the fact," Goolsby says.

Higgins also says first-time users often miscalculate the time it will take to see an effect because they usually see an immediate turf reaction to a chemical application. There's a three- to seven-day lag period where superintendents won't see a reaction, and the tendency is to reapply too soon, Higgins says.

"You have to be patient," Higgins says. "It's the way these products are designed to release, so don't panic."

Thomas says controlled-release products provide the best value for his money.

"You get more efficacy with less labor, which saves money and allows you to allocate your crew members to other projects," Thomas says. "There's no doubt they pay for themselves in the long run."■

## Controlled Release Comes to Insecticides

Pursell Technologies recently gained approval from the Environmental Protection Agency for its polymer-coated insecticide, Precise. Jeff Higgins, director of market development for the company, says the product allows superintendents more flexibility when it comes to controlling turf insects.

"Slow-release insecticides increase the residual effects of the insecticide, which means superintendents have the ability to kill pests at all stages of development," Higgins says. "It promotes lower use rates, reduces applicator exposure and offers the flexibility superintendents might not have otherwise."

Rick Brandenburg, a professor of entomology at North Carolina State University who researched the product, says controlled-release insecticides also minimize the odor associated with other insecticides.

"That's a real plus, particularly if you have to apply it to a course surrounded by houses," Brandenburg says. "Its slow-release mechanism also reduces the amount of insecticide released into the environment at one time. Those environmental concerns are shared by golfers, homeowners and superintendents."

Precise controls fire ants, mole crickets, sod webworms, cutworms, armyworms, chinch bugs and others, Higgins says. Pursell is also conducting research on its effectiveness on white grubs, he adds. The slow-release mechanism increases the efficacy from two or three weeks up to 14 weeks in some cases.

Brandenburg believes slow-release products may be the wave of the future.

"It's exciting technology," he says. "The product lines which use it are going to be expanded. It's going to be a fascinating area to watch over the next five years."

**– F.A., Managing Editor**

### For more information on controlled-release products, see these companies:

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