Bud White, director of the USGA's Mid-Continent Region, believes the only value a chemical test would have in giving superintendents information on aerification is indicating the salinity of the soil.

"If it shows that you have higher salts than you should, that would tell you that you need to do more aerification and venting so you could flush better," he says.

A physical test, White says, is really the most telling when it comes to aerification. Sending in an undisturbed core to an accredited lab will offer information on the percentage of organic material in different layers and what the dilution rate is, or the percentage of sand versus organic material.

"It's important to keep that dilution up with sand where you're building organic matter in the rootzone so that the rootzone stays porous to air and water movement," says White.

"When that upper portion becomes more organic than sand, it seals off the top of the rootzone and creates a false perched water table, which ruins the air and water movement into the soil."

After the test results are back, it's up to the superintendent to determine a course of action, whether that be doing more aerification and topdressing (which go hand-in-hand for the dilution) or nothing at all – because the results indicate that their current program is doing a good job of keeping air-filled porosity up and capillary porosity down.

White says some superintendents test their soils annually, but believes that most can get by doing it once every two years.

"You sure don't need to do it more than once a year," White says. "If I had salt in my irrigation water, I would be testing my greens twice a year because of the tendency to leach nutrients."  

For more...
Check out the August 2012 USGA Green Section article "Don't Guess – Check the Numbers!" about how soil testing reports can impact your aerification practices. Enter bit.ly/16DHVxi into your browser to access this article.
WHERE DID THE SUMMER GO?
As we move into fall, take a look back at your year to begin prep for 2014.

It's already September and, as always, the summer seems to fly by quicker and quicker each year. Despite an unusual low amount of pest activity reported on golf courses across the country, this summer was no exception.

As all golf course superintendents are aware (and most golfers and members forget), Mother Nature was again the star of the season and in total control. For those of us in the Mid-Atlantic, the spring started out very slow with moderately cool temperatures delaying the season.

While this was somewhat of a problem for getting the turf going in the spring, it was probably more of a problem for golf rounds across the country. I recall everyone's excitement about rounds being up when we had an early spring in 2012. Speculation about hitting a "turning point" as it relates to the business of golf was being proclaimed by many. After the slow start this year, however, it appears that Mother Nature was likely to blame for the increase in rounds in 2012 and the decrease in 2013.

The relatively cooler temperatures continued into early summer and on top of that, June was marked with record setting rainfalls. Philadelphia received its highest recorded precipitation with over 10.5" of rain for the month. Many golfers remember this as it coincided with a little golf event called the U.S. Open. During the month of July, disease outbreaks went from reports of moderate dollar spot to overnight outbreaks of Pythium. It was apparent that summer had finally arrived. I spoke with numerous superintendents during this period and saw my share of disease samples. Everyone was in panic mode and felt like things were finally getting back to what I consider a "normal" summer. However, as quickly as summer arrived it decided it would leave in the same manner.

During the month of August (at the time of writing this) the highest daily temperature (according to weather.com) in Philadelphia was 88°F and occurred on a single date. Even better were the nighttime temperatures, which occasionally dropped into the 60's. This year was definitely different and far from normal.

The unusually cooler summer wasn't without its problems though, and turf loss was still evident in some locations. In the Northeast, annual bluegrass weevils again seemed to steal the show. According to reports in the Turfpath App, adult weevils first were observed in the Maryland region in mid-April and continue to wreak havoc now.

Overall disease activity seemed to be low to moderate. Dollar spot developed on a fairly typical schedule in most regions and was relatively severe early in the season. Pythium and algae dominated July as heavy precipitation occurred in conjunction with the three week stretch of high temperatures. On the other hand, reports of diseases like summer patch were lower than normal.

Despite what I would consider an easy year as far as temperatures and stresses were concerned in the mid-Atlantic region, other areas weren't so lucky. Reports of unusually high temperatures in many locations throughout New England resulted in some considerable stress to annual bluegrass not acclimated to the heat.

While this report focused primarily on what I observed in the mid-Atlantic and Northeastern US, it should be pointed out that other parts of the country had experienced their own unusual summer. Much of the Western US had the warmest July on record, while other areas continued to experience drought conditions. In contrast, Florida's July was among the wettest on record.

Unusual seasons like this are always a little concerning for me. Although the season is far from over, many golf course superintendents took advantage of the weather and widespread reports of "it's the earliest I've been able to aerify ever at our course" were seen throughout Twitter and Facebook. As we head into the fall, those courses that made it through the summer unscathed will likely have the healthiest turf heading into winter. For those courses that didn't escape the damage, the relatively mild temperatures should afford the turf the ability to recover quickly.

Unusual seasons like this are always a little concerning for me. In year's where death and destruction is widespread and the result of an angry Mother Nature, everyone seems to get a free pass. In relatively mild years like 2013 (for some regions), it seems that many clubs use any small decline in

(KAMINSKI continues on page 64)
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Flumioxazin: A pre-emergence herbicide option for warm-season turfgrasses

Annual bluegrass (*Poa annua*) is widely regarded as one of the most troublesome golf course weeds. There are many factors that make annual bluegrass a difficult-to-control weed. Pertinent to herbicidal control, the weed has a long germination period that can outlast the control period of many pre-emergent herbicides. Many times this long germination period requires multiple pre-emergence applications, follow-up post-emergent applications, or both to achieve complete control. Annual bluegrass can also exist as a short-lived perennial, limiting the usefulness of pre-emergent herbicides. Lastly, the weed has developed resistance to many herbicides, making both pre- and post-emergence control more challenging.

SureGuard is a new herbicide for the turfgrass market that offers a solution to some of these problems. Flumioxazin, the active ingredient in SureGuard, inhibits the protoporphyrinogen oxidase (PPO) enzyme in susceptible plants which eventually leads to the desiccation of the plant. This mode-of-action has both pre- and post-emergence activity. Pre-emergence control results from soil application where the herbicide is predominantly absorbed by the roots. Post-emergence control results primarily from foliar contact, which causes rapid desiccation and necrosis with negligible translocation.

This mode-of-action is similar to oxadiazon (Ronstar).

Summary points

- SureGuard (Flumioxazin) can be utilized for pre- and post-emergent annual bluegrass control
- Use is limited to dormant Bermudagrass unless induced dormancy can be tolerated
- Post-emergent control is limited to annual bluegrass plants less than 2 tillers in size.

Above left: The non-treated plot from 2011. Above right: The plot after the November application.
Managers familiar with Ronstar Flo will note that it should not be applied to actively growing turfgrass because it can lead to foliar necrosis. The same is true with flumioxazin. However, since both herbicides have limited translocation within the plant, established grasses can recover. Therefore, application of both SureGuard and Ronstar Flo is restricted to dormant periods.

Flumioxazin may be an alternative to other herbicides currently available in Bermudagrass (Cynodon sp.) for annual bluegrass control. Having both pre- and post-emergent activity, it may be possible to apply flumioxazin after annual bluegrass germination has begun. That is, the post-emergent activity would control plants already emerged while the pre-emergent activity could control weeds not yet germinated. Post-emergent applications may control perennial biotypes of annual bluegrass and provide residual control. Additionally, there are no reports of annual bluegrass resistant to flumioxazin or other PPO-inhibitors, which could benefit managers with herbicide-resistant populations. Despite these beneficial aspects of flumioxazin, applications on Bermudagrass and other warm-season turfgrasses are limited to periods of dormancy which could limit application timings that are safe for use.

"Optimal flumioxazin application timing is dependent on Bermudagrass dormancy and annual bluegrass maturity, which will vary by specific climate and geographic region."

RESEARCH CONDUCTED. Research was conducted to evaluate application rate and timing of flumioxazin for annual bluegrass control in hybrid Bermudagrass (Cynodon dactylon × C. transvaalensis). Application timings evaluated were November, December, January, February, and March. At each application, flumioxazin was applied at 6 and 12 oz product per acre with nonionic surfactant at 0.25% v/v. Research was conducted at Auburn University during the 2010-2011 and 2011-2012 seasons and at the University of California, Riverside in 2011-2012. All locations had a history of annual bluegrass infestations. Data collected included annual bluegrass control, Bermudagrass injury, and overall sward quality.

A greenhouse study was also conducted to determine the maximum annual bluegrass size that flumioxazin can control post-emergently. Annual bluegrass plants were treated at pre-tiller (approximately 3

RESULTS. Flumioxazin at 12 oz per acre rate resulted in better annual bluegrass control than the 6 oz per acre rate. November and December application timings were the best for annual
“Flumioxazin, the active ingredient in SureGuard, inhibits the protochlorophyllide oxidase (PPO) enzyme in susceptible plants which eventually leads to the desiccation of the plant. This mode-of-action has both pre- and post-emergence activity.”

bluegrass control. Control from flumioxazin at 12 oz per acre applied in November was 95% or better through the following April and was 78% or better from December application. Other application timings resulted in less than 70% control, regardless of rate. These later application timings did not control emerged annual bluegrass plants due to their larger size which allowed them to recover after initial herbicide injury; conversely, earlier applications did control emerged plants.

Greenhouse research indicated that flumioxazin at 12 oz per acre can control annual bluegrass up to the 2 tiller growth stage. However, larger plants (4 to 6 tillers at application) were not controlled. flumioxazin at 12 oz per acre resulted in better control than when applied at 6 oz per acre. These findings agree with field research – that larger plants are not adequately controlled, and that control is better from 12 oz per acre, rather than 6.

In field research, annual bluegrass was flowering at the January, February, and March application timings. Having weeds present for so long before control is implemented would be unacceptable to golf course managers and users. Therefore the January, February, and March application timings are impractical if this herbicide is used as the sole chemical for annual bluegrass control.

Annual bluegrass generally begins germination in September, where the research was conducted. Therefore, some annual bluegrass plants were emerged for all application timings. Since flumioxazin has pre- and post-emergent activity, emerged annual bluegrass plants were controlled at the same time and with the same herbicide that the pre-emergence application was made.

Bermudagrass was dormant at all application timings except November. No Bermudagrass injury was observed except from the November application, which resulted in complete necrosis of the foliage. New, green foliage was not produced until spring green-up, due to the onset of the dormancy period. Therefore, flumioxazin induced dormancy of the Bermudagrass. Other research indicates that Bermudagrass will completely recover from flumioxazin injury in approximately 4 weeks. No adverse effects of any kind were observed during spring green-up from any treatment.

The induced Bermudagrass dormancy resulted in superior turfgrass quality through much of the dormant period because these plots were uniformly dormant, as opposed to a motled, uneven dormancy that occurs when Bermudagrass naturally enters dormancy. Therefore, in one sense, the November application of flumioxazin resulted in unacceptable Bermudagrass injury, but in another sense, the treatment resulted in better turf quality during the dormant period. Understanding this issue prior to its occurrence may mitigate apprehensions of golf course managers.

Bermudagrass was near complete dormancy at the December application timing, so no injury was observed. Therefore in practice, it is likely that a mid-to late-November application timing is best in the environments that were studied. Optimal flumioxazin application timing is dependent on Bermudagrass dormancy and annual bluegrass maturity, which will vary by specific climate and geographic region.

SureGuard may have other valuable uses beyond what was evaluated in this study. Summer annual weeds, including crabgrass (Digitaria spp.) can be controlled with SureGuard. Early pre-emergence applications for crabgrass control (made before Bermudagrass spring green-up) may also have burn-down type control of other winter annual weeds. 6G1

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IN A 24/7 WORLD, WHY DON'T I HAVE IT NOW?

With technology controlling our lives, sometimes it's nice to disengage.

The world has become a grind, but that doesn't mean we can't find ways to shut it down even for a short period of time. Social media has become a great turf tool, so let's look at taking that a step further and help us refuel and recharge with our new community.

I often say, ten to twelve years ago it was "I need that tomorrow!" Five years ago, "I need it now!" Now it's "Why don't I have it yet?" We have become a 24/7 world. In the golf world, it means we are expected to be 100 percent all the time. We must be ahead of the game. Creating and innovating isn't expected to stop. The days of "We are in maintenance mode are gone."

So what has done this to us? Well, you're probably reading one of them or holding one in your hand to tweet something out. Technology has made this world 24/7. Processes happen faster and information spreads quicker so we are forced to keep pace.

The turf industry has embraced the use of social media. It is one of the best tools a superintendent has to stay ahead of the 24/7 world. We have been able to communicate faster and more effective to stay ahead. But in this 24/7 world we must find time to disengage from the world that is turf.

Social media has allowed us to grow our network. We can talk to fellow colleagues and friends all over the world with just a few clicks. Since most of us remain engaged in social media as a community even when we aren't talking turf, let's take a look at some platforms to take advantage of this new community we have built.

Social media in fitness has become big, so big at times you might not even realize you are using it. Many of us turn to fitness for release, so why not share this with your friends?

Running is a quick and relatively easy way to get your 30 minutes a day of physical fitness. Through social media, I see lots of turfies talking about running, competing in Tough Mudders and Spartan Races. Nike+ is a great community to help encourage each other and even create a little competition. The Nike+ platform allows you to create communities of friends to share your runs which includes times, distances, energy burned and even the areas you enjoy running. Turn to the Nike+ map and see where everyone in your area enjoys running. Add other turf friends to your friends list to share some camaraderie. Maybe even find local turfies to create a Tough Mudder or Spartan team.

I am sure you have all seen tweets like "My fitbit #Fitstats for...." Many of us carry or wear pedometers on us now. The most popular are the Jawbone UP, Fitbit Ultra or Flex and the Nike Fuelband. These are more fitness trackers as they track activity, calories burned and provide you an overall look at how active you have been. These too connect to a community of users. I personally have many friends in the turf industry in my Fitbit community. This creates a little competition for all of us, challenges us to stay fit and even provides for some lighthearted discussion when one of us falls behind.

Enjoying time with your family on a day trip? You can use social media communi-

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THE MONROE DOCTRINE

50 YEARS OF MOWING
Celebrating what John Deere has brought to the industry.

For the past 20 years or so, when late July arrives and I can sense the tough days of summer on the golf course were rapidly diminishing, I started to think about Badger and Packer football, apples and pumpkin harvest, and an actual weekend off.

I also started dreaming about which steam and antique power shows I would attend, always hoping to make it to half a dozen.

These shows are a step back in time in American agriculture, often a reminder of the way we farmed in my youth. Binders and threshing machines, straw piles and stationary balers, and lots of old tractors are among the most popular exhibits at these antique power shows. And of the old tractors, the two-cylinder Johnny Poppers are about the favorite, a tough confession for a Ford and Oliver man like me.

At any show the thumping of these engines can be heard all over the park grounds.

John Deere created the start of quite an industrial empire more than 175 years ago when he put his blacksmithing skills to work and fashioned Illinois, in the 1830s. He needed the Mississippi River to transport steel and coal in, and finished product out to markets.

University of Illinois archeologists unearthed much of the Grand Detour site in 1962, and it is an extremely interesting historical preservation. I have seen his big house in Moline and stood at the foot of his grave there as well.

A number of years ago I was invited to attend a two-day event at Deere headquarters planned for grass guys, including a large number of superintendents. It included a tour of the headquarters building and the museum.

Years later I managed a tour of the John Deere Horicon Works. That's the Wisconsin factory that for the past 50 years has been building consumer products and grass machinery.

The plant is located on the edge of the Horicon Marsh, the largest freshwater cattail marsh in the U.S. It is well known to both bird watchers and hunters – 350 species of birds have been seen there, and huge flocks of Canada geese come and go each year.

The factory was built in the 1860s and of the old tractors, the two-cylinder Johnny Poppers are about the favorite, a tough confession for a Ford and Oliver man like me.

And of the old tractors, the two-cylinder Johnny Poppers are about the favorite, a tough confession for a Ford and Oliver man like me.

It was a very successful mower, and many of the first year machines still run today. It featured a 7-horsepower Kohler engine (yes, that Kohler!) and a three-speed tranny with variable speed drive that made for fast mowing and slow tilling.

So, this year collectors and staff at the Horicon Works decided to celebrate John Deere's 50th anniversary in the grass mowing business.

The three-day event was held at the Dodge County fairgrounds, a few miles from Horicon. Many of the early engineers, designers and production staff from 1963 returned. The event included factory tours (Gators and LGTs are made there now), Deere LGT collectors from all over the country, a tractor cavalcade each noon hour, and demonstrations. There was a swap meet, a flea market, and toy tractor and toy implement peddlers.

The chatter all day long was about serial numbers, wiring harnesses, carburetors, and memories of days gone by.

I thought about how the Model 110 had influenced the career of a former employee at our golf course – Emily Buelow. Her father was an engineer at