

# The Root of the Matter

To get the most out of a fertility program, superintendents consider several factors. Even so, it all comes down to nutrients

## ABOUT THIS SERIES

*Golfdom*, in unison with AGROTAIN International and LebanonTurf, aims to educate golf course superintendents through this special three-part series.

**Part two** of the report focuses on the art and science of fertility. The two stories presented here discuss the reasons why fertilization does more to improve poor-quality turfgrass or maintain good-quality turfgrass than any other management practice. In **part three**, which runs in December, we'll peek into the not-too-distant future – 2025 – to see what golf course superintendents will use as fertilizer and how they'll be using it. **Part one**, which appeared in October, examined modern-day fertility management.

## ALSO:

Research Is More Important Than Ever, page 26

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# In These Times, Research Is More Important Than Ever

**B**ill Gates, surely the most successful college dropout ever, says he sometimes picks up *Time* magazine and reads every article from beginning to end, even the stories that don't interest him. "That way you can be certain to learn something you didn't know previously," says Gates, who left Harvard early to start Microsoft.

Learning is also an essential ingredient of any business, no matter how established or successful. For more than 60 years, LebanonTurf has been an active research participant, continuing to learn about innovative ways to improve our products, manufacturing capabilities and service. Short- and

long-term projects conducted in cooperation with many of the nation's leading academic research institutions, including Arkansas, Auburn, Cornell, Nebraska and Rutgers, help us make the care and management of turfgrass more efficient and cost-effective for golf course superintendents and lawn-care professionals.



By Mike Sisti

As expectations for pristine conditions continue to escalate at the same time that economic forces and regulatory restrictions add new challenges for the turfgrass industry, research has never been more vital. Research also provides the classic win-win-win situation for manufacturers, universities and end-users.

Fertilizer manufacturers turn to the nation's most respected turf programs and researchers to test new ingredients or products, or even to confirm theories on which they may have based decisions for years. What we learn through research helps us go to the market with more confidence and information, and as a result help our customers make better purchasing decisions.

Funding these projects, as well as providing equipment and other resources, help the universities' turf science programs continue to grow in size and stature. One of our longstanding research relationships is with Rutgers University. We recently presented a check for \$280,556 to the

school's Center for Turfgrass Science as royalty payment for its help in turfgrass research. Bruce Clarke, Ph.D., and director of the school's Turfgrass Center, said support from LebanonTurf and other manufacturers has been "critical in helping us develop the best turfgrass varieties to bring to the market." Royalties from its partnership with LebanonTurf and other private sector firms support the center's grassseed breeding program and encourage additional faculty research, Clarke says.

The symbiotic relationship between manufacturers and researchers also provides the assurance that end-users rely on for decision-making and purchasing.

A recent project we undertook to support our Green-Smart technology provides an example of the research process working to all parties' benefits. With the help of our research partners, we ran trials with different fertilizer formulations to see if we could squeeze more efficiency out of the manufacturing process. Based on the outcome of those tests, we were able to develop a better formula that was easier for our manufacturing plant to process. Ultimately, the improved efficiency will help end-users because it adds to our economies of scale, which makes products created with Green-Smart even more price competitive.

When it comes to research, if you never stop learning, you never stop seeing the possibilities. ■

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*Mike Sisti is marketing manager for LebanonTurf, a division of privately held Lebanon Seaboard Corp.*





# Finding the Right Products in a Tough Economy

**B**oth at home and at work, the condition of today's economy has each of us seeking ways to cut back without compromising quality. Not only are we looking at ways to stretch the family budget, we're also making adjustments to our business practices to accomplish more with less.

These incremental changes — some small, others major — help to increase efficiency while positively impacting the bottom line with little or no negative effects. This cost-cutting, uncompromising formula can certainly be applied to changes in your turf program.

Although changing to cheaper products or fewer applications can create negative impacts on turf health, transitioning to "smarter" products represents creative solutions that allow you to do more with less. This is most definitely the case with fertilizer.

Fertility options are seemingly endless because superintendents can choose between granular or spray; slow release versus stabilized, or even quick release; their desired number of applications and the amount applied per application; and the preferred timing for each application. All of these options are necessary because not every fertility program works for every soil type, in all climates, every year.

Finding the right product to complement your fertility program that fits into your budget and yields the expected results of healthy vigorous turf is why we at AGROTAIN International are so proud of our products. Nitrogen efficiency, value and versatility are all qualities of UMAXX, UFLEXX and HYDREXX.

## Nitrogen efficiency and value

When it comes to performance and return on investment, no other urea-based product compares to UMAXX. It's the most efficient nitrogen source you can find for the money, and delivers more usable nitrogen than other sources. Even better, UMAXX delivers high performance at a significantly lower cost than the competition and can be used in either soluble or granular form.

Coupling urea with proprietary enzyme inhibitors, UMAXX delivers improved nitrogen efficiency, increases plant utilization and minimizes environmental loss.

And because it does not rely on temperature, moisture or microbial activity for release, you stay in complete control of your nitrogen program and performance. UMAXX stays

in the available ammonium form ready for the plant to take it up as needed. This stabilized form reduces nitrogen loss, making it a nitrogen management tool for those geographies with water-quality guidelines. In addition, this results in reduced grass clippings, maximum visual color and an environmentally responsible product.

## Fertilizer versatility

Versatility of application is a unique feature for UMAXX when compared to other sources of nitrogen. UMAXX is available in a granular form either in straight 50-pound bags designed for soluble applications or as the nitrogen source in a blend. Soluble applicators pour UMAXX into the spray tank strainer cavity while water is filled. It readily melts into solution and does not settle out. It can be mixed with other plant nutrients, fungicides, growth regulators or insecticides.

UMAXX can also be added to your fertigation tank. It's a 47 percent nitrogen product that can be added to any granular blend as well, and provides the same integrity and performance regardless of the application type.

We've found success stories from superintendents from Washington to New York, from California to Florida, and from Minnesota to Texas. These superintendents have unique stories to tell regarding the application type and timing, but all have seen the benefits to their budget and turf vigor and appearance. To read more UMAXX secrets or to share your story, go to [www.WhatsHisSecret.com](http://www.WhatsHisSecret.com). ■

*Stegmann is president of Lange-Stegmann Company and AGROTAIN International.*

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**By Mike Stegmann**



# *The* **Right** **Stuff**

BY JOHN WALSH, CONTRIBUTING EDITOR

**Soil conditions, turf type and location are a few factors that determine a proper-functioning fertility program**

PHOTO COURTESY: SYNGENTA PROFESSIONAL PRODUCTS







**F THE THREE MOST** significant aspects of managing turfgrass — mowing, irrigation and fertility —

superintendents have the most control over the latter. They concede mowing control to members and irrigation control to Mother Nature.

But more control doesn't necessarily make fertility easier. If not done properly, it'll cause pest problems. Fertility also affects other cultural practices.

"You won't get the most out of other cultural practices if the fertility isn't right," says Mike Richardson, Ph.D., professor of turfgrass management and physiology in the department of horticulture at the University of Arkansas in Fayetteville.

And because of member expectations, Charles Peacock, Ph.D., professor and extension turfgrass specialist in the department of crop science at North Carolina State University in Raleigh, is concerned superintendents are keeping turf a little too lean.

"I understand trying to limit inputs because of the environment and budget constraints, but you can't starve turf during critical times," Peacock says. "There has to be a balance between being too lean and overfeeding. Superintendents need to make sure the plant gets what it needs."

"The vast majority of superinten-

dents are malnourishing greens in pursuit of ball-roll distance," says Cale Bigelow, Ph.D., associate professor of agronomy at Purdue University in West Lafayette, Ind.

"Superintendents tend to starve putting greens for speed," says Frank Rossi, Ph.D., associate professor of turfgrass science in the department of horticulture at Cornell University in Ithaca, N.Y. "That's where you get into trouble."

And turf needs, which are affected by weather, vary annually.

"You don't need the same amount of nitrogen every year," Peacock says. "There's often a 2x range based on climate conditions. No year is exactly on average."

With more aggressive fertility comes more aggressive mowing and potential thatch issues. Presently, many superintendents are thinking about using more plant growth regulators instead of using lower fertility rates to control growth.

"Once you lower fertilizer rates (and the turf gets damaged), it takes longer to bring back the turf," Bigelow says. "So ensuring the turf is actively growing will benefit overall performance."

To get the most out of a fertility program, superintendents usually consider three big macrofactors: geographic location, soil conditions and type of facility. Even so, it all comes down to nutrients.

### **I've got needs**

Turfgrass plants need 16 essential nutrients, three of which come from air and water and the rest from soil. So a balanced nutritional program is most important, fundamentally, because no element can substitute for another. Superintendents need to focus on nitrogen, an essential macronutrient, and iron for color, Rossi says.

"There's a need for the others, but I can't find too many reasonable people who say we're underapplying other nutrients," Rossi says. "Other than nitro-

gen, we don't have soil tests that say how much other nutrients we should add. I don't think there's a justification for a lot of the fertility that's done."

Others question the quantity of other nutrients.

"Calcium is overused and over-sprayed," Richardson says. "It can't be translocated down into the plant. Superintendents should know how all the different nutrients move into the plant."

On fairways and tees, the range of nitrogen per year is 3 to 4 pounds. On bentgrass greens, that range can go from as low as 1 pound up to 10, Bigelow says.

"Ten pounds was not uncommon 15 years ago," he says. "Four pounds is more appropriate nowadays."

Richardson says 99 percent of superintendents use historical data to determine the nitrogen needs of a plant.

"Some day, units of nitrogen will be applied based on the months of growth," he says.

### **Soil's importance**

Any fertility program should be based on soil type, which will dictate the nutrient-holding capacity of a fertility system. A sound soil-testing program provides a historical perspective to see what's been done to help provide a baseline to start.

"Some superintendents don't use soil testing programs properly to see how fertility is changing the soil," Richardson says. "Superintendents need to ask themselves, 'Is what I'm doing increasing, decreasing or saving the nutrients in the soil.'"

Every year is different. One year 25 inches of rain might fall; the next year there could be 50 inches. Some nutrients could leach through the soil.

"It's good for superintendents to look back at the year and determine what conditions forced them to change nutrition," Richardson says. "It's always critical to

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« **"The vast amount of superintendents are malnourishing greens in pursuit of ball-roll distance."**

**— CALE BIGELOW**

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add needed fertility based on soils.”

Soil tests should be conducted at least once a year or twice a year for greens, Richardson says. “In Florida, for example, I’d sample more frequently because the growing season is 12 months,” he adds.

Soil tests can save superintendents money in tight economic times. “If you don’t need something, don’t put it down,” Richardson says. “Before, it used to be, ‘Well, I’ll put it down anyway just to be on the safe side.’”

For sand-based greens, there’s no need to test the soil for nutrients because there’s no buffering or holding capacity in those sand systems, Rossi says.

“In soil-based systems, we’re finding we’re overestimating the need for nutrients, i.e., phosphorus,” he says. “Now it’s 20 pounds per acre. It was 40 pounds per acre five years ago.”

Soil tests, which aren’t expensive, are a necessity because without them superintendents are just guessing. “Sometimes superintendents don’t follow through after the test,” Peacock says. “They need to follow the recommendations closely.”

Generally, sandy soils tend to lack iron and manganese. With highly reactive soils (heavy clay soils with high aluminum), superintendents have to keep up with pH levels to prevent aluminum from becoming toxic to root systems, Peacock says.

Before implementing a fertility program, a soil test needs to be conducted because superintendents need to get an idea of what the soil is like and nutrient availability. Is there a potential pH problem? Could there be problems with aluminum toxicity or nutrient availability? Are soil amendments needed?

For example, soil in the rural Midwest is generally uniform if it hasn’t moved, says Rich Gaussoin, Ph.D., professor and extension turfgrass specialist in weed science at the University of Nebraska-Lincoln. On newer golf

courses, where a lot of soil has been moved for mounding, the soil isn’t uniform because the subsoil was brought to the surface. In cases like these, the pH level can range from 5.5 to 9.

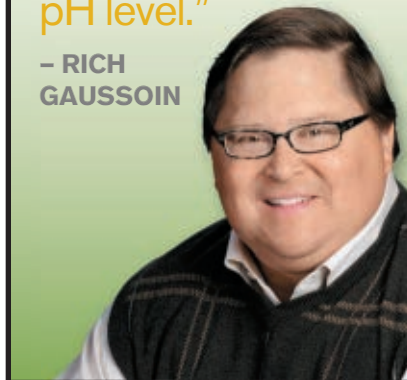
“Did the location have deep soil or shallow soil when building the course?” Gaussoin asks. “When you bring it all to the surface and get grass growing, the grass tempers the soil. Generally, soil is only a problem during grow-in and three to four years after that. The plant, through the addition of organic matter, often buffers a problematic pH level.”

### Different needs

Obviously, geographic differences — arid or cool, wet areas, for example — will affect fertility programs, too, as well as the intended use of the area: greens, tees, fairways, rough and the clubhouse lawn.

“Generally, soil is only a problem during grow-in and three to four years after that. The plant, through the addition of organic matter, often buffers a problematic pH level.”

— RICH GAUSSOIN



“Superintendents look for places to reduce fertility,” Bigelow says. “Maybe they won’t fertilize an entire fairway each time, and just fertilize landing areas.”

Because greens are the most noticed piece of real estate, most fertility tweaking is done there, Gaussoin says, adding there’s less fertility tweaking in fairways unless problems arise.

“It’s not that big of an expense to spend money on foliar products for greens,” he says. (See sidebar about liquid vs. granular products.) “The tweaking on greens isn’t with N-P-K, the macronutrients — it’s the micronutrients. It’s all about timing and shifting to a different program during stressful summer conditions where foliar products provide not only nutritional value but have documented stress relief if the products contain constituents such as amino acids and cytokinins.”

Rough areas, where inputs are decreasing, are often left alone. In some cases, more attention is being paid to tees than fairways. Some superintendents are treating tees with foliar products, and others are using a modified form of liquid on fairways and greens.

“Because of the economy, superintendents are carefully looking at fertility programs, sticking with protecting greens and green surrounds and cutting back in the rough,” Bigelow says.

Additionally, some superintendents are being more precise with nitrogen applications — going out more frequently at lower amounts — on fairways and tees.

### Cost and timing

There are times when missed opportunities are almost impossible to correct, Peacock says, citing construction as the most important time to fertilize.

“You need lime and phosphorus,” he says. “It takes years to correct those deficiencies with surface applications because they’re slow to react when applied that way. Still, some people get it

# Liquid or Granular?

## Determine the goal of fertilizer use before choosing its form

Liquid or granular — which one is used and why? Many superintendents use both types of fertilizer, and some superintendents are switching to an all-liquid program. But no matter the form of nutrients, the bottom line is creating an environment for good uptake.

Charles Peacock, Ph.D., knows superintendents who have an entirely foliar fertility program, yet the professor and extension turfgrass specialist in the department of crop science at North Carolina State University knows superintendents who are perfectly happy with their granular program that includes supplemental liquid fertilizer.

For superintendents using liquid fertilizer in combination with other products, they need to make sure everything is compatible, says Rich Gaussoin, Ph.D., professor and extension turfgrass specialist in weed science at the University of Nebraska-Lincoln. He encourages superintendents to test their irrigation water to determine the pH level because

wrong. You want to get those nutrients in then so the roots can grow.”

Cost affects timing. “Fertilizer was never an issue before because it was cheap,” Richardson says. “Now, superintendents want to save money, so they’re asking more questions about getting good conditions with less fertilizer. Timing is more important, and slow-release products are attractive in the rough and fairways.”

Additionally, Europeans are measuring the nutritional demands of turf by conducting research about demand-driven fertilization, in which superintendents apply different levels of nitrogen and at different growth stages.

### Turf type

Turf type is yet another factor for fertility. For example, perennial ryegrass, usually in fairways, needs more fertilizer than other cool-season turfgrasses, Gaussoin says. With spreading grasses on greens, such as bermudagrass and creeping bentgrass, superintendents should be careful with nitrogen because

some products need a buffering agent.

There are more biologically active products coming to market, too.

“Most foliar products have things like elicitors, phosphites, amino acids and cytokinins in them that are beyond fertility, and get superintendents through the summer,” Gaussoin says. “It’s way beyond nutrition.”

In the South, liquid applications on fairways are occurring mostly at high-end clubs with zoysiagrass, says Mike Richardson, Ph.D., professor of turfgrass management and physiology in the department of horticulture at the University of Arkansas in Fayetteville. Superintendents are adding iron to get color.

“More are using foliar fertilizers on fairways and tees than I thought,” Richardson says, citing a survey his department conducted. “It’s done to give the turf a pop before a big event.”

Still, Richardson preaches to superintendents that they need to think why they’re putting down a foliar fertilizer and what products they use. — *John Walsh*



too much of it results in thatch, which can compromise play.

“In my region, the cool-humid region, superintendents frequently apply nitrogen to try and stay ahead of dollar spot,” Bigelow says. “You can reduce the severity of this disease with a sound fertility that promotes rapid recovery.”

Warm-season turf, bermudagrass especially, needs more nutrients than cool-season turf, Richardson says. Cool-season turf on greens typically receives 1.25 pounds to 1.5 pounds of nitrogen per active growing month, usually five months. Fairways and tees usually receive 5 to 8 pounds of nitrogen annually. Zoysiagrass requires lower fertility. On greens, 1 to 2 pounds of nitrogen per 1,000 square feet is normal for a whole season. Too much fertilizer can cause disease problems, he says.

The amount of fertilizer needed depends on geographic location, the soil type and management approach.

### All natural

Naturally organic and biosolid products are gaining popularity, especially in the Northeast, Bigelow says.

A turf plant doesn’t care what form of nitrogen, potassium and phosphorus it’s given — it will take it up as an ion, Peacock says. In organic fertilizer, nitrogen is in a more complex form that needs to be broken down, a process (composting) that needs to happen before a plant can uptake nitrogen. Because it depends on microbiological activity to break down nitrogen and other nutrients, it needs soil temperatures of 60 F and higher to work. Conventional fertilizer works in any soil temperature.

Ultimately, superintendents need to understand the growth patterns of the turf they manage.

“It’s not what you use, it’s how you use it and when,” Peacock says. “You need to match what the turf requires with how you groom it for a particular use.” ■

*Walsh is a contributing editor to Golfdom.*



Ron Furlong likes to spoonfeed greens on a regular basis.

It's tempting to reduce nitrogen levels on greens to keep them smooth and fast — but not at the sake of jeopardizing their health for four days of glory

# Tournament Prep & Fertility

BY RON FURLONG,  
CONTRIBUTING EDITOR

**H**AVING GOLF COURSES PRIMED for Major tournaments makes for great theater. This past year, all three courses that hosted majors in the United States — Augusta National, Bethpage Black and Hazeltine National — were all in phenomenal shape, and it showed on our high-definition television screens as well as with the players' comments who, almost man for man, raved about each course.

Although most superintendents will

never get to host a Major, it's exciting when an opportunity comes along every now and then to primp your course for some special event and give it the old Augusta touch for a week. I received such an opportunity this past summer, hosting a PGA qualifier for the Pacific Northwest. It was fun to deck out the course for the four-day event and present the best possible "PGA Tourney" conditions we could.

However, what I soon came to realize, while prepping for the event, was



just how stressful such conditions would be on the course and, specifically, the greens. And, upon further realization, I realized how important turfgrass fertility would be, combined with all the other management factors, in the quick recovery of the turfgrass from the stress we would be heaping upon it.

The “other management factors” I mentioned above, excluding fertility, include (but are not limited to) mowing height, rolling, verticutting and topdressing, moisture levels, wetting agents and plant growth regulators.

Here’s a quick rundown of these factors:

■ **Mowing height.** In midsummer, we normally mow our Poa greens at .120. For this event we dropped them to .110. The PGA wanted our greens in the 10.5 range on the Stimpmeter. Any quicker, with our undulations, would’ve been bordering on unfair. We had to be careful not to get them too quick. During the week they Stimped a perfect 10.5 to 11.

■ **Rolling.** Normally (excluding the occasional one-day tourney), we roll every other week. For the qualifier, we rolled each of the four days in conjunction with a mow before each roll.

■ **Verticutting and topdressing.** A week before, we verticut and applied a light topdressing, as we do every second week during the season.

■ **Moisture levels.** We kept the greens on the drier side, electing to hand-water daily while letting the computer water lightly at night. Again, being careful to keep them firm, yet being able to hold a shot.

■ **Wetting agents.** We applied a wetting agent at a lighter than normal rate about nine days before the start of the tournament.

■ **Plant growth regulators.** Normally, we apply Primo Maxx every 20 days. We shortened the interval to 14 days and applied four days before the event.

No other factor is as singlehandedly

important to any golf tournament than the weather. We are all at Mother Nature’s mercy, and must react to whatever she tosses our way. We are like a hitter in the batter’s box as she throws us a curve ball, followed by a tricky slider, followed by a high heater and then, lastly, a wicked change-up. Mother Nature has a nastier change-up than Johan Santana (wonder what the Yankees would pay for her services?).

The change-up she fired at us was the fact that normally, from June 1st to the end of August, we receive an average of 6.5 inches of rain. This year the total was a measly 1.5 inches.

So, all of this brings us to fertility. Obviously, you want to keep the greens somewhat on the lean side heading into a tournament. Lush turf is slow turf. However, you don’t want to caution too far on the lean side, either. Starving Poa often results in a weak plant that has trouble recovering from stress. That

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**Don’t stop fertilizing greens for a tournament to make them fast. To keep them quick, hand-water the greens to keep them on the drier side.**





⚡ Have a solid fertility plan going into the tournament. You don't want to jeopardize the future health of the course's greens for four days of glory.

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wasn't what we wanted, but it can be a tricky line to toe.

Maintaining a slightly lower nitrogen level a couple weeks before and then into the week itself, while perhaps upping the potassium level just slightly, can possibly be a good plan of attack. But replacing those lost carbohydrates in the heat of summer is vital — somehow enhancing the root growth during the time of year when you simply don't have them (long roots, that is).

Mike Erb is a sales representative for Wilbur Ellis in the Greater Seattle area, and a valuable resource for fertility guidance for many superintendents, myself included. Mike agreed with me that having a solid fertility plan going into such an event is the major key, instead of reacting afterward when the damage is most likely already done. You don't want to jeopardize the future health of the greens for four days of glory.

"I wouldn't lower the fertility," Mike told me. "Turn off the irrigation and hand-water for the event. Keep them quick with a plant growth regulator and rolling, but avoid dropping fertility rates. Keep them growing."

Spoon-feeding with low nitrogen levels, like most of us are doing on a regular basis anyway, can be key in providing the best timing for detailed control. This especially holds true for those of us with Poa greens, where it's not uncommon to have upwards of 20 different strains of Poa on one green. The frequent (every two weeks) feeding is essential to maintain, if nothing else, consistency of the playing surface. Biostimulants, which help replenish but don't overstimulate, are another useful tool during such stressful periods, replenishing with gibberellins, cytokinins and auxins.

The disadvantage most courses have when they primp for a special event, compared with a U.S. Open or a PGA Championship course, is we don't get to shut down the greens right after the event. Often, a course hosting a Major, or even hosting a regular annual PGA Tour event, will have the luxury to raise heights, give a good feeding and stop mowing for a few days.

Revenue dictates a different story for most golf clubs. In fact, the day after this four-day event, we had an outside group invade our course with a 27-hole shotgun tournament.

The best plan is to simply have a plan. Have the foresight to understand your greens and how they will be after your big event.

No one knows your greens better than you. Don't mortgage the farm on a single tournament, no matter how important. Get those roots down as deep as you can going into the tournament and hope Mother Nature misses the strike zone with her change-up. Maybe, if you're lucky, she'll groove a batting-practice meatball right over the plate. ■

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