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* Price includes standard GreensGroomer without attachments or options. FOB Indianapolis, IN USA

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achieve desired results.

Water testing will determine the nutrient load, if any, from the irrigation source. Many turf managers are obliged work with high-salinity water issues. The major water/soil quality issues related to salinity include: alkalinity (high pH); total salinity (electrical conductivity/TDS); sodium hazard (SAR); and bicarbonate hazard (adjusted SAR).

Tissue testing as a nutrient-management tool has increased in popularity. It addresses the plant as a separate, yet complementary, program from the soil.

Tissue testing verifies both the amount and the ratios of nutrients present in a plant's leaf. Tissue testing will help identify nutrient restrictions and site-specific issues. In addition, it will help determine any need for an increase or decrease of certain nutrients at critical times of the year to support optimum plant health.

Most errors in tissue testing occur during sampling. Therefore, for best and most consistent results, sample at the same time of day and as close to the same environmental conditions (i.e. sunlight, soil moisture, temperature) as possible.

[Sampling is extremely important. Unfortunately, most errors occur during sampling. Strategies vary for soil collection including the number and depth of samples.

Tissue testing problems include potential contaminants, sampling times, consistency, and delivery methods. We will likely present an in-depth article at a later date on the entire subject of tissue and soil sampling.]

Soil vs. tissue testing

Soil testing generally precedes tissue testing for routine fertilizer and amendment recommendations. An extractable/soluble soil analysis indicates the relative availability of nutrients in the soil. Tissue analysis indicates which nutrients have been taken up and used by the turf.

Tissue testing in combination with soil testing is an excellent way to develop a strong fertility program. When building a nutrient program remember to use sound agronomic principles. Maintain the correct ratios of soil water and air.

Overuse of nitrogen, phosphorous and potassium (N-P-K) is usually the most common mistake. Secondary macronutrients and micronutrients are also essential. A solid fertility program should consist of both soil- and foliar-applied fertilizer(s) based on soil and tissue test recommendations plus personal observations of plant health including growth, color, and response to fertilizer applications.

Interest in foliar feeding by practitioners and scientists has increased recently.

Some fertilizer manufacturers have initiated research designed to develop a better understanding of how to facilitate more efficient nutrient uptake and use.

Foliar nutrient absorption is a physical and chemical process that is faster and more efficient than granular, but does not provide a soil reserve or bank. The best program(s) include both foliar and granular fertilization. Ultimately, that combination requires less nutrient input than granular only.

Foliar nutrition also addresses several common concerns including Integrated Pest Management (IPM) and minimizing nutrient loss from leaching and runoff.

We are currently in the third year of a study to determine the efficiency of foliar uptake based on individual nutrients applied, turf type, and temperature extremes. Four major universities are doing the work on four turfgrass varieties. This cutting-edge information will help turf managers better understand foliar nutrition and where to target nutrient amounts after soil and tissue testing have been completed. ■

Gary Grigg has more than 41 years experience as an agronomist and is co-owner of Grigg Brothers, www.griggbros.com.

Fertilizer program "bank"

Foliar nutrition provides rapid response, targets needed nutrients and balances spoon-feeding with lower rates and higher frequency.

When seeking a foliar product, pay particular attention to chelating agents, low salt concentration, buffering capabilities, and identifiable ingredients from a quality source.

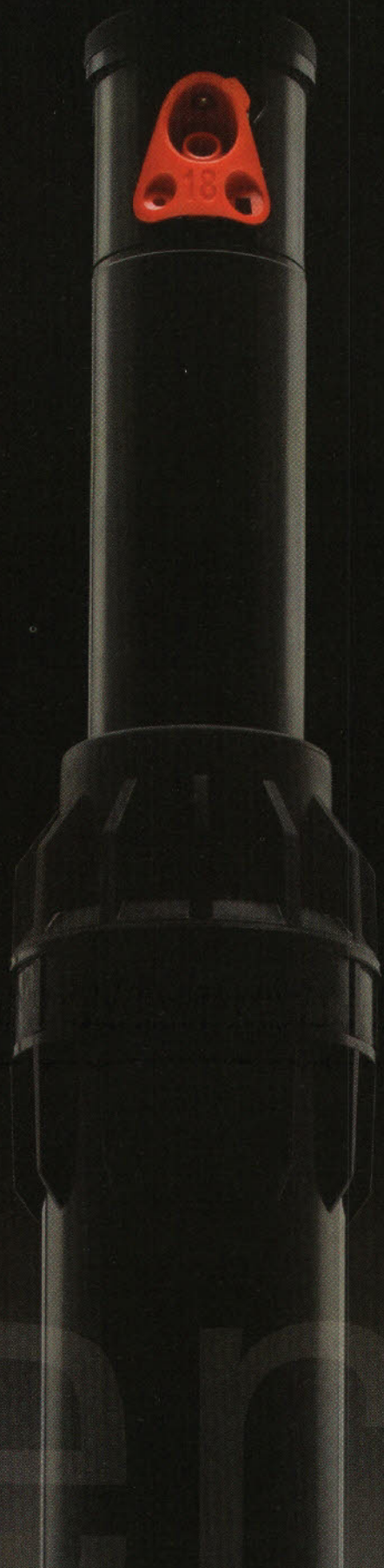
Foliar feeding can be very helpful when plants have poor root structure, soil temperatures are extreme, turf is under stress, pH problems exist, water quality is poor, difficult growing conditions are present and new growth is needed quickly.

Turf managers need to look at their soil fertilizer program as a "bank." The soil tests show how much is on deposit. Balance nutrients on the cation exchange sites with soil-applied fertilizers. This is how sports turf managers have traditionally developed their fertility programs.

Tissue tests are also important and reflect withdrawals from the soil "bank."

In addition, if obviously needed, make the appropriate "deposit" directly to the plant with foliar nutrients, which bypass soil cation exchange and root absorption.

Remember to work both sides—the soil and the plant.



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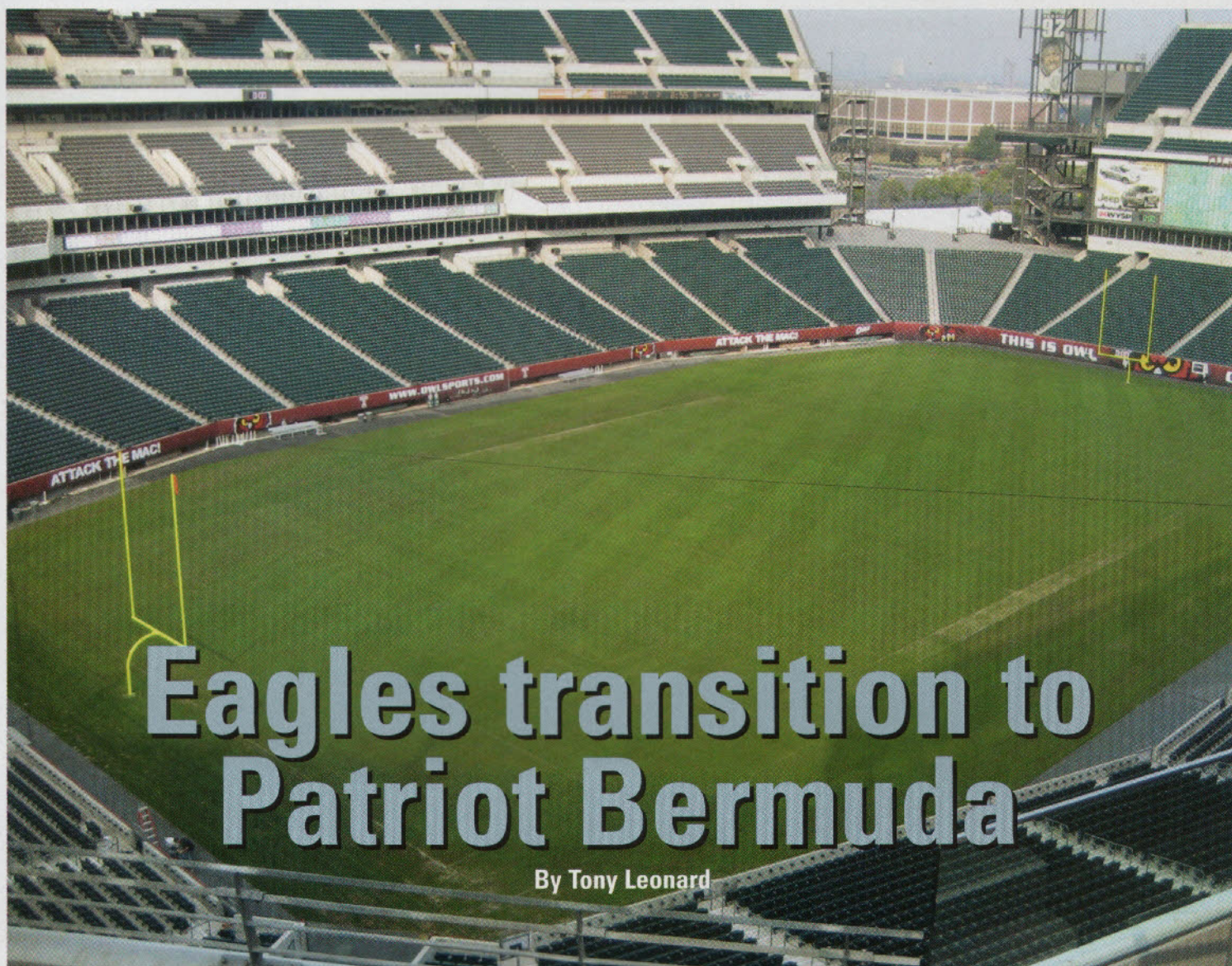
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Eagles transition to Patriot Bermuda

By Tony Leonard

October 17

Over the past few years, it's been down right hot in the Philadelphia area. It was not uncommon to see week-long stretches of highs in the mid 90's and lows in the 70's. Add in the high humidity levels that travel with this weather and heat indexes are well into the 100's.

When you introduce extreme heat to the cool season grasses for an extended period of time, the roots creep back up to the surface and the overall plant health deteriorates. The city is concrete and asphalt and very little green, thus creating higher temperatures; the field itself is surrounded by concrete and plastic. There is very little cool air throughout the summer months.

Hosting both Temple University and Philadelphia Eagles home games, Lincoln Financial Field's DD Grassmaster field has to be ready to endure a pounding every 7 to 14 days. The first 2 years, dur-

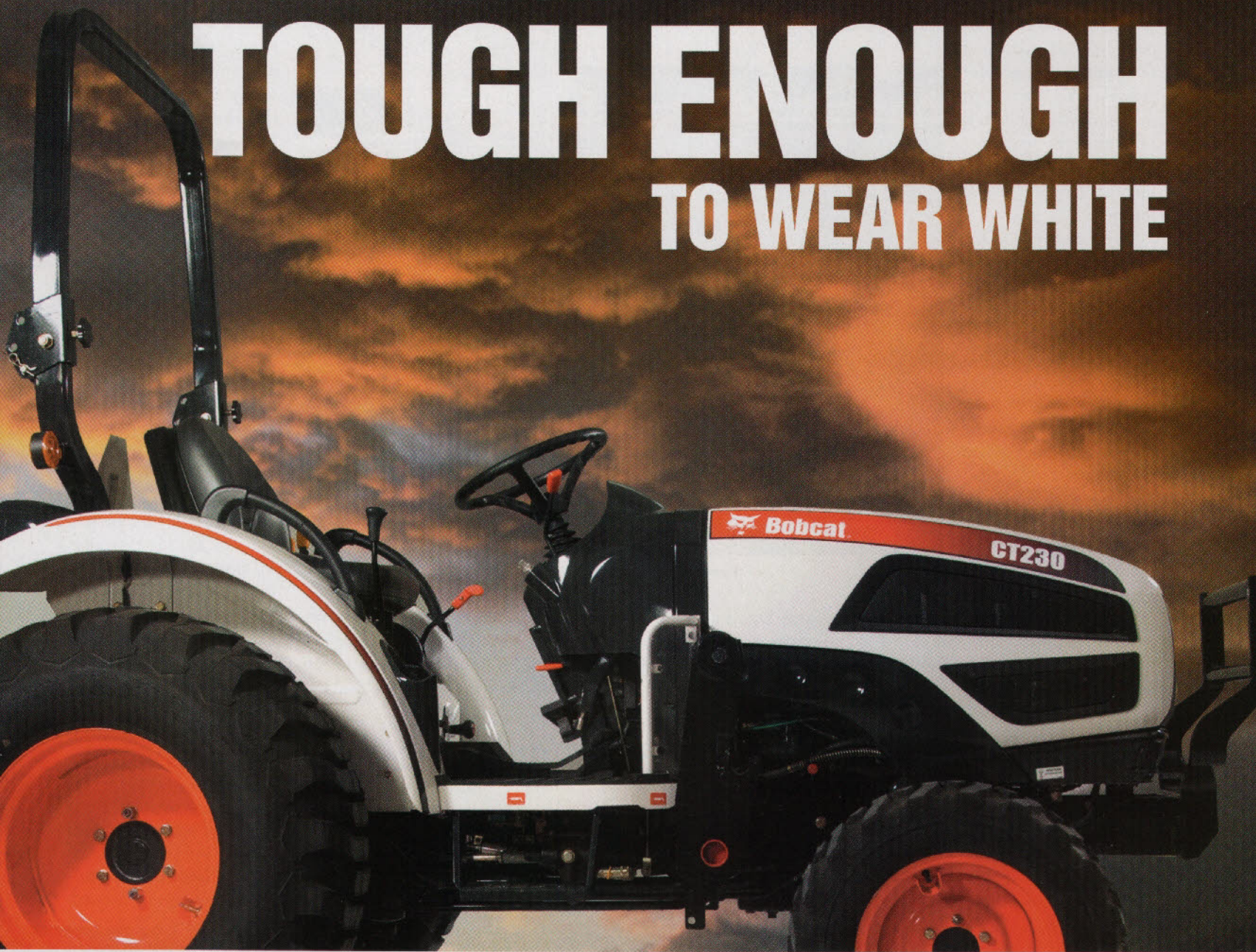
ing which the summers were a little bit more manageable, the field performed well. But the next 2 years saw record heat and although the field would appear to be healthy, the root system and health of the plant suffered. The footing was fine due to the Grassmaster system but the plant recovery through September was less than acceptable.

The center of the field would deteriorate quickly causing us to overseed with a blend of perennial and annual ryegrass much sooner, and heavier, than we normally would. The young grass would never have a chance to mature due to the high volume of traffic on the field. By the end of the season, the field was worn and very little was left to work with for the following year.

Looking around

Patriot bermudagrass was being used at Purdue University,

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Indianapolis Colts practice complex, the Baltimore Ravens practice facility, the University of Maryland, and Virginia Tech University, just to name a few. Given the location of these places, the grass is more cold tolerant compared to traditional bermudagrasses. We started to look into bringing Patriot to Philadelphia in August 2006, the beginning of 6 months of evaluation and research.

My assistant, Dan Shemesh, and I made site visits to some of these Patriot bermudagrass fields. Everyone that we spoke with was very pleased; the biggest complaint was that it grew too fast! For some of us, this is not a bad thing!

After evaluating our own field throughout the football season, I became more convinced that Patriot was the right way to go. I contacted Mike Sullenberger of Game Day, Inc. Sully has installed and maintains more than 100 Patriot bermudagrass fields in the DC, Virginia, and Maryland areas. He shared his experiences with us as well as his advice.

Following the football season, we had a decision to make. We knew we were going to grind off $\frac{1}{4}$ inch of the existing field, which is a common practice with Grassmaster fields every other year. Do we reseed with blue and rye, or do we sprig our field with Patriot bermudagrass? Sprigging was the only way to install Patriot and maintain the DD Grassmaster system. It was risky, but Sully and I were both comfortable that we could have a field before summer if we sprigged in the spring. Having growth blankets and a subsurface heat

system would allow us to do this.

I recommended to our front office that we pursue the Patriot bermudagrass and why we should. I provided weather data, first hand accounts, pictures and grow-in plans as part of my report. They gave us the green light to do so in February.

We were not exactly sure when we were going to sprig the field. It was scheduled for April 15, but with the ability to heat the soil and keep it covered, sprigging sooner was still an option. We were given a few bushels of sprigs to experiment with in February. After the field was grinded off, we stripped it of all grass and just the fibers remained. Four 10 x 10-foot areas were made into test plots, two on a heated zone and two not. Of the two plots in both sections, sprigs were cut into the soil in

one, and the other, the sprigs were spread overtop and topdressed.

It was surprising, but encouraging, that the plot that was cut into the heated soil, provided positive results within 2 weeks. Sully and I decided that the sooner we could get the field sprigged the better.

The field was sprigged on March 28. We used about 700 bushels per acre to cover the 2.3 acres.

The process took about 4 hours; sprigs were cut into the soil at a 1 to 2 inch depth. Immediately following sprigging, growth blankets were applied with cut outs for the irrigation heads to pop up over top the blankets. With non-stop watering for 3 weeks and temperatures consistently climbing into the mid-70's, we pulled the blankets for the first time to mow. In fact, the grass started to emerge from the growth blanket. The field was mowed and fertilized



First game on new sod, December 2



Two days after Kenny Chesney concert, June 25

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before the blanket went back down. This process went on through mid-May when we removed the growth blanket for good. The field was thin in areas but we knew when the weather would break it would fill in.

By mid-June the field was about 95% filled in, but we had a concert in 2 weeks that would create additional stress. The massive stage build began on a Monday for a Saturday concert and the last truck didn't get off the field until the following Monday afternoon. Terraplas was installed



Thirty-three days after concert, July 27

for the seating areas on Thursday night and taken off the field by Sunday 6 AM. The field under the Terraplas was fine and recovered within a few days. However, the areas under the stage, primarily the roadways, took about 3-4 weeks to fill back in. By late July though we were ready for the football season.

After the first exhibition game, the field appeared to be chewed up, which caused me a somewhat sick feeling; but after we swept the field and mowed it, the field was just about ready for play again. As the season went on, these feelings subsided

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after we knew that the footing was never compromised and the grass would recover. Overseeding was a weekly maintenance practice for us as well.

The difficult challenge with Patriot is the aggressiveness of the grass and its ability to "run over" any new seed that had germinated. Again, the newly seeded field had very little opportunity to establish itself with an aggressive football schedule in the fall.

As we went deeper into the season, the weather got cooler, the sunlight wasn't as intense, the field naturally started to decline. Our biggest stretch was in late November when we faced three games in just 8 days, with the last game being played in the rain. Two were Temple games, and the last one was an Eagles game. In early November, we made arrangements with Tuckahoe Sod Farm to install thick cut bluegrass sod over the existing field if needed after the Eagles game. With three games remaining in December, I felt it was the right decision for the players and fans. After the Eagles rain game, we cut a lip into the existing field around the perimeter for the sod to taper in to. With 10 days until our next game, we were able to aerify, topdress, and prepare the field as necessary for the remaining games. Following the season, the sod was removed and the bermudagrass, which was still green underneath, will have a chance to reestablish and become a much stronger field for 2008. Sully and I will evaluate the field in the spring

to determine which areas will need to be resprigged.

So even though last summer's work load was a little more for me and my crew, in the back of my mind I knew I was doing something that the grass would benefit from. The hotter it got, the happier the grass was and the happier I was! After talking with guys like Sullenberger, Al Capitos, Don Follett, Dr. Mike Goatley, and Dr. Cale Bigelow, just to name a few, I felt it could be done.

Questions still remain as to the relationship with the DD Grassmaster system, the overseeding window and rates for this area, and the relationship with the heat system and the grass with regards to soil temperatures. As for our decision to resod, I feel that it was not a failure to the system, but another step in our management practices of our field. This was the first time that I'm aware of that a DD Grassmaster field has been sodded overtop. Now that we have done this successfully, it will become part of our normal maintenance. In fact, I believe that it will protect our bermudagrass late in the season from cold weather and from being torn out more with the wear and tear from the remaining games. I am excited for the recovery of the field and starting the process over knowing that it will be a stronger field next season. ■

Tony Leonard is sports field manager for the Philadelphia Eagles.

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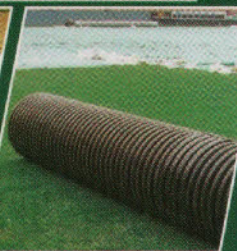
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