Controlling Turfgrass Ant Colonies:
A Catch-22 for Golf Course Superintendents

Seed: What’s in the Numbers?

Between the Lines —
KAFMO’s Steve LeGros Helps Bring National Mall Back to Life
“I spent the past 18 months studying turfgrass at Penn State. This is my office. What more could you ask for?”

Mike Stell, Quail Hollow Club
Penn State, Class of 2015

Get the edge you need to succeed in turfgrass management in just 18 months.

turf.psu.edu/apply
Once again, we’re making a splash.

Introducing our new Azoxystrobin liquid formulation.

Quali-Pro® of Control Solutions is proud to launch its liquid formulation azoxystrobin fungicide which contains 2 pounds of active ingredient per gallon. Strobe 2L is a broad spectrum fungicide with protectant, curative, eradicant and systemic properties. It is specifically formulated for use on golf courses, commercial and residential lawn and landscape areas, parks, recreation areas and athletic fields, and is an excellent addition to fungicide resistance management program rotations.

Get connected: 

Strobe is a trademark of Control Solutions Inc. Quali-Pro is a registered trademark of ADAMA Group Company. For more information on our wide selection of turf and ornamental products, visit quali-pro.com, controlsolutionsinc.com, or call 850-242-5552.
Features

8 Cover Story
Controlling Turfgrass Ant Colonies: a Catch-22 for Golf Course Superintendents

12 Turf Basics
Seed: What’s in the Numbers?

16 Research Summaries
Updates on Research by Penn State’s Turf Team

18 Between the Lines
Updates from KAFMO — KAFMO’s Steve LeGros Helps Bring National Mall Back to Life

Departments

6 President’s Update
7 PTC Membership Invitation
16 Penn State News
20 In Memoriam
22 Calendar of Events
22 Penn State Turf Team
22 Advertiser Index
Outsmart Mother Nature... Year Round!

EVERGREEN™ TURF COVERS

With 30 years of field proven experience and the longest warranties, EVERGREEN™ from COVERMASTER is the smart choice

SMART EDGE TECHNOLOGY™
- Hems and grommets are not required
- Unlike Polypro fabrics, EVERGREEN™ will not unravel
- Can be cut to custom sizes and shapes on site
- Anchor pins can be placed anywhere on the cover

UNIQUE DESIGN CREATES A TRULY 4-SEASON TURF COVER
- Winter blanket • Early spring green-up • Summer overseeding & repair • Frost protection • Extend your growing season

BE SURE TO ASK FOR EVERGREEN™, THE ONE WITH COLOR
- Provides additional light spectrum benefits for the turf
- Choose color based on your climate

Call Toll Free: 1-800-387-5808
Int’l: +1-416-745-1811 • FAX: 416-742-6837
E-mail: info@covermaster.com
www.covermaster.com
© 2013 Covermaster Inc.

Bill Mast
Cell: 610-608-8319
bmast@aer-core.com

Steve Thompson
Cell: 610-972-5933
stthompson@aer-core.com

Office: 610-327-3390 • Fax: 610-327-0581
1486 S. Hanover St. • Pottstown, PA 19465 • www.aer-core.com

Specialized Turfgrass Services

- Deep Tine - Solid and Coring
- BLEC Ground Breaker Linear Aeration
- Traditional Shallow Coring
- Sandmaster Drainage
- Drill & Fill
- Top Dressing
- Seeding
- Verti-Cutting
- Total Regrassing
Happy New Year! At last, winter is here, and my hope is that this season of the year provides you and your team time to reflect upon this past year, relax and plan for 2016. As you sit back to evaluate what worked well in 2015 and how you will tweak your plan for next year, I encourage you to use the Pennsylvania Turfgrass Council as a resource. The PTC strives to provide educational opportunities for its members so that you may have the tools and knowledge needed to do your job. Be sure to attend one of the many excellent conference opportunities this winter season to better prepare for the upcoming year!

As we kick off the New Year, I’m happy to welcome so many new members, and I’m thankful for our loyal PTC membership. The PTC serves an integral role in our community, driving growth and success for green-industry professionals across the country and especially here in Pennsylvania. In 2015, the PTC awarded two academic scholarships to Penn State turf students who excelled in their studies and are leaders of their class. In addition, the PTC gifted $50,000 to the Penn State turf project. This gift is applied to numerous special opportunities that include, but are not limited to: funding a master’s degree for several graduate students, sending groups of turf students to compete in the annual STMA and GCSAA competitions and aiding in the development of leading-edge research that the Penn State turf team conducts on a daily basis. As a member of the PTC, not only do you reap the educational benefits of attending an annual conference and obtain access to cutting-edge research and development, but also your membership supports the entire green industry.

If you have not already signed up to become a PTC member, or if you have not renewed your membership, I encourage you to join us today. To do so, please visit our webpage at www.paturf.org. Also, if you have taken on a new position in the past year or if your contact information has recently changed, please notify our office, so that you continue to receive important PTC communications.

I hope that you enjoy this winter season and that the frost doesn’t bite too hard this year. Enjoy this edition of Pennsylvania Turfgrass magazine, and pass it on to your friends and colleagues. On behalf of the entire PTC board of directors, I would like to thank you for your continued support, and we welcome your feedback and/or questions. Please contact the PTC office, or contact me directly at 610-451-3229 (or andrewd@berkshirecountryclub.org).
PTC Invites You to
—BECOME A MEMBER! —

By joining the Pennsylvania Turfgrass Council (PTC), your club or company, or you as an individual, become part of an organization dedicated to promoting professionalism in all aspects of the turfgrass industry and support of the Center for Turfgrass Science at Penn State University.

• PTC provides educational opportunities for practitioners in all turfgrass-related industries.
• PTC provides grants and other support for education and research programs at Penn State University.
• PTC encourages future industry leadership by granting scholarships and awards.
• PTC acts as a liaison to the green industry by promoting open dialogue with government agencies, private institutions and the general public.

PTC provides educational opportunities for practitioners in all turfgrass-related industries.

PTC provides grants and other support for education and research programs at Penn State University.

PTC encourages future industry leadership by granting scholarships and awards.

PTC acts as a liaison to the green industry by promoting open dialogue with government agencies, private institutions and the general public.

PTC Invites You to
—BECOME A MEMBER! —

MEMBERSHIP CATEGORIES

Individual — $50 annual dues
For the green-industry professional who wants to be part of the Council and support its activities.

Sustaining — $200 annual dues
For the business or turf professional who takes an active role in promoting the profession of turfgrass management, professional development and educational opportunities in the turfgrass industry.

Partner for Growth — $400 annual dues
For the business or club that desires a stronger affiliation with the Council and the Penn State Turfgrass Science Program.

Join online today, or renew your current membership at — www.paturf.org/membership
The membership year is January 1 through December 31.

Learn more about Progressive and our Dealers at:
(800) 668-8873  (519) 527-1080  fax: (519) 527-2275
www.progressiveturfequip.com  info@progressiveturfequip.com

The Progressive ADVANTAGE

✓ Proudly designed and manufactured in North America
✓ Features to reduce your cost of operation over the long haul
  ■ Maintenance Free Blade Spindles
  ■ Four blade choices to optimize cut and costs
  ■ 100 hour extended service PTOs
  ■ 3 yr. gearbox warranty
✓ An extensive Dealer network that you can rely on
  ■ Knowledgeable and dedicated to the Turf industry
✓ Widest range of rotary finishing mowers available from one source
  ■ Two models with galvanized decks
  ■ Four models with the Pro Lift-N-Turn™ system

The Better Built Choice."
For a turfgrass entomologist, nothing marks the transition into summer better than the arrival of turfgrass ant mounds on close-cut turf on golf courses. *Lasius neoniger*, commonly referred to as the “turfgrass ant,” is a minute (about 2 to 3 mm, see Photo 1), tan to black ant that is seemingly ubiquitous in open fields and turfgrass sites across cool-season growing regions in North America. Ants are present throughout the year, although they only truly make their presence known as the colony grows in the early days of summer and as mounds appear within the interior portions of greens, tees and fairways.

Managing turfgrass ants is difficult at best, since many superintendents report unsatisfactory control with insecticides. Additionally, it is believed that turfgrass ant issues have intensified dramatically since the 1990s, since broad-spectrum insecticides used in white grub management have been phased out (e.g., organochlorines) and newer, more selective insecticides (e.g., neonicotinoids and anthranilic diamides) have taken their place (Werle 1999).

Despite their obvious downsides, turfgrass ants play a vital role in the functioning of a healthy turfgrass environment. What is often forgotten is that these insects are tirelessly at work, churning the soil and reducing some of our more common turfgrass insect pest populations. Clearly, controlling these nuisance ants comes with tradeoffs.

**Mound building**
The turfgrass ant is the most abundant ant species in cool-season turfgrass growing regions in North America, outnumbering all other ants in open fields and full-sun areas with well-draining soils. Any given turf site may have several species of ants present. However, the turfgrass ant is one of only a few species that creates visible mounds in turf sites.

Turfgrass ants produce mounds that are small (5 to 10 cm in diameter, Photo 2) and volcano-shaped, whose numbers fluctuate throughout the season in response to increases in colony size. Mounding is most severe in close-cut, sandy areas (e.g., modified sand-based putting greens). These areas are often prone to intense mounding since workers can more easily excavate the coarse soil compared to native soil surrounds.

Not only are the mounds an aesthetic problem, but also the turf underneath the mound is lost when smothered. Mowing over the mounds may disperse the soil, but it can also damage equipment by dulling the reel or, in extreme cases, clogging the machinery. Mounding can also affect the uniformity of — and ball roll on — the putting surface.

**Turfgrass ant lifecycle**
Ants, like some bees, wasps and termites, are social insects. Social insects live in a nest or colony and have overlapping generations and a specialized labor force. Some members forgo their own reproduction (sterile) to benefit the colony. From a pest-management standpoint, ants are difficult to control since their task specialization allows for maximum reproductive output and offspring survival. Successfully managing turfgrass ants requires an understanding of how populations develop throughout the year and then exploiting weaknesses in the colony.

The formation of a colony begins in late summer when winged reproductives (virgin males and females) leave an established colony. Synchronized swarms can be observed
flying or walking in open turf areas (Wilson 1955). Afterwards, mated females can be observed walking across the turf looking for a site in which to dig a nest and start a colony. Prior to, or shortly after entering the nest, she will break off her own wings, settle down for the winter and possibly produce a small batch of eggs.

If the queen (Photo 3) is lucky enough to survive winter, the first batch of larvae is produced. The larvae develop into female workers that will forage for the colony’s food. However, these offspring are much smaller than workers found at other times of the year, since the queen is incapable of foraging and must feed her offspring a nutrient-poor diet of saliva. Therefore, the colony grows slowly and is susceptible to die-off in spring.

Mounds become visible in late spring as larger workers are produced and foraging increases. The queen is located in the main nest, usually in the heavier, native soil surrounds. The main nest consists of relatively shallow, open chambers that may lead to side tunnels to the surface (Photo 4, page 10). Over the next few weeks to months, secondary or satellite

PICTURED AT RIGHT:

PHOTO 1: Lasius neoniger, commonly referred to as the “turfgrass ant,” is tiny (about 2 to 3 mm, shown next to a penny).

PHOTO 2: Turfgrass ants produce small, volcano-shaped mounds.

PHOTO 3: A turfgrass ant queen.
mounds open on the tees and putting greens as subsequent generations of forage workers are produced due to a result of an improved diet. It is estimated that greater than 90% of the satellite mounds are located within 1 to 2 meters of the green-rough interface (Maier and Potter, 2006).

The short turf allows the workers to forage over a greater area, removing small prey (insects and other arthropods) that may have been injured or killed by mowers. Foraging and colony growth will increase throughout the season, although it may experience a plateau or even reduced mounding as mid-summer approaches. Mature colonies may exist for several years, producing virgin queens that may form their own colonies at the end of every summer.

Management
Superintendents attempting to control ants after mounds appear (curatively) become frustrated when suppression is short-lived. Product timing and selection are important, but meaningful control can be achieved only if the queen is killed. Without the queen, the colony plunges into chaos and will perish. However, targeting the queen is difficult because contact insecticides do not penetrate the nest, and delivering insecticide through the use of baits has shown limited promise in turf. Attempts to control new queens upon emergence with contact insecticides has shown promise, although the time in which the queens are exposed is variable and may require multiple applications (Maier and Potter 2006).

Given these challenges, reducing the flow of energy into the colony during slow growth periods remains the most viable option for mound suppression. Contact insecticides (particularly pyrethroids) are commonly applied to the surface of active mounds in late spring or early summer to reduce foragers. Contact insecticides, though often providing a quick knockdown of mounding, may provide only 7 to 14 days of suppression, or just long enough for larvae in the colony to mature and replace foragers that were killed. This strategy may be more effective when applied earlier in the spring when mounds first appear and workers are small and few.

Neonicotinoids, like thiamethoxam and clothianidin, can also be effective in reducing mounding, but reductions are not immediate, typically occurring one to two months after application. Applications of neonicotinoids or combinations of a neonicotinoid and a pyrethroid in the fall and/or early spring (when colonies are weakest) have demonstrated to be most effective at providing long-term control (Shetlar and Andon, 2012).

Predatory activity
Controlling turfgrass ants may have indirect effects on many of our other insect pests. Any insecticide application, but especially broad-spectrum insecticides, may have unintended consequences on other insects, including beneficials. Secondary pest outbreaks occur when a pest population that has been controlled by a predator population is allowed to outbreak with the removal of the predator.

Ants are ferocious predators of small insects, including some of our most devastating turf insect pests. Several studies have shown that turfgrass ants are egg predators of sod webworm (Cockfield and Potter, 1984), black cutworm (Lopez and Potter, 2000) and white grubs (Zenger and Gibb, 2001). It is not surprising that turfgrass ants can reduce these pest populations, since the rapid growth phase of turfgrass ant colonies often coincides with the pests’ oviposition periods.

Recently, I have heard many anecdotal stories of ants controlling annual bluegrass weevil populations. The annual bluegrass weevil (Listronotus maculicollis) (ABW) is a widespread (and spreading) problem on short-mown turf from eastern Canada to Ohio and North Carolina. Given that ABW egg and larval populations peak during ant-colony growth phases and that they occur in similar areas on golf courses, it is quite possible that turfgrass ants impact ABW populations.

However, the suppression of ABW populations by turfgrass ants is speculation. I am somewhat skeptical in the ability of ants to provide moderate or meaningful impact. For one, ABW possess many cryptic or hidden stages that may be protected within the plant from an ant attack. ABW chew notches in the stem of the plant to deposit eggs underneath the leaf sheath, unlike the aforementioned insect pests that lay eggs loosely in the soil, thatch or leaf tip. The impact that ants have on young larvae is also questionable, as early instars are stem borers and thus protected within the plant.

Our research
In summer 2015, the Turfgrass Entomology Laboratory at Penn State initiated several studies on turfgrass ant management. In particular, we are interested in documenting the...
impact that turfgrass ants have on ABW populations and if ant populations warrant conserving in high-value turf areas. Additionally, studies have been initiated to explore the effect of soil modification practices on colony establishment, survival and mounding. We hope to have preliminary results by early 2016 and, more importantly, some insights into managing ants or at least finding tolerable thresholds for coexistence with these amazing creatures on turf sites.

**Literature**


Lopez, R. and D.A. Potter. 1999. Ant predation on eggs and larvae of the black cutworm (Lepidoptera: Noctuidae) and Japanese beetle (Coleoptera: Scarabaeidae) in turfgrass.

Environ. Entomol. 29: 116-125.


Seed: What's in the Numbers?

By David R. Huff, Ph.D., Professor of Turfgrass Breeding and Genetics, Penn State University

Seed serves as a remarkable means of plant propagation, particularly in terms of commercial application of plant material. It ships well, it stores well, and large-scale establishment can be achieved relatively quickly at low cost. In the turfgrass industry, it is most typical that cool-season species are propagated by seed, whereas warm-season turfgrass species are propagated vegetatively through either sprigs or sod. While there are exceptions to this general tendency (i.e., vegetatively propagated cool-season species and seeded warm-season species), for the most part, our industry utilizes seed to establish cool-season turfgrass species like bentgrass, perennial ryegrass, tall fescue, Kentucky bluegrass and fine fescues, while vegetative propagation is commonly utilized for warm-season species like bermudagrass, St. Augustinegrass, zoysiagrass and seashore paspalum.

Much has been written about using seed as a means of turfgrass propagation, including the basic importance of various aspects like purchasing, applying and establishing seed; for example, being able to properly understand and utilize the important information contained on a seed label like the calculation of the percent Pure Live Seed (PLS) for comparing the true costs of different seed products (example, see http://plantscience.psu.edu/research/centers/turf/extension/factsheets/seed).

However, in this article, I would like to present some of the different, though no less important, aspects of using seed to establish areas of turf. For example, over the years, I have found that most turf managers view their seed as an individual cultivar or variety, in that all the seed in a bag, of say ‘Penncross’ creeping bentgrass, is genetically all the same. The truth is that each individual seed gives rise to a genetically unique individual plant. By genetically unique, I mean that some plants will be big and others small, some will be dark green and others light green, some will tiller more while other stay less dense, etc. This is because each seed in the bag of seed was the result of a fusion between a sperm from the pollen-donator parent plant and an egg from the seed-bearing parent plant. And just as in animals, insects and human beings, each individual is genetically unique and different from all others because each was derived from a unique combination of sperm and egg that gives rise to their genetic uniqueness.

A numbers game

I often like to tell my students that there are more stars in the universe than all the grains of sand on all the beaches of planet Earth and that there are more genetically different individuals of ‘Penncross’ creeping bentgrass than there are stars in the universe; but that statement seems to lose its impact unless you do the math, so let’s do the math (see Figure 1).

There are approximately 700 trillion cubic meters of beaches on planet Earth, and using an average medium sand particle size that is equivalent to 8,000 sand grains per cubic centimeter, that equals 5 quintillion (5 x 10^18; in this decimal notation, 10^18 is a 1 followed by 18 zeros) grains of sand on all the beaches of planet Earth. Now, there are approximately 250 billion stars in our Milky Way galaxy, and there are approximately 200 billion galaxies in the known universe. That equals 50 sextillion (50 x 10^21) stars in the universe (give or take).

These are very large numbers of things, too large really to even comprehend; however, they pale in comparison with the number of genetically unique individuals of sexually reproducing species, like creeping bentgrass. To estimate the number of genetically unique individuals of creeping bentgrass, we’ll apply a standard genetics formula that uses the number of different combinations of different forms of any given gene to the power of the total number of genes that an organism possesses. On average, this number is 1 x 10^30, or 10 different combinations per gene to the power of 30,000 genes per organism. I don’t even know that there is a name for this number, but I do know that it is a very large number.

Finally, of the total amount of all this
Genetic variation within the creeping bentgrass species, approximately 2/3 of the genetic variation have been found to reside within cultivars, while 1/3 has been found to reside between cultivars. And thus, if we assume that there are roughly 200 cultivars of creeping bentgrass in today’s market (there really aren’t that many, but it helps to make the numbers work better), then the total number of genetically unique individuals that might exit within the ‘Penncross’ cultivar would roughly be on the order of 1 googol (or $1 \times 10^{100}$); that is a 1 followed by 100 zeros). Thus, there is way more number of genetically unique individuals of Penncross creeping bentgrass, or any cultivar of creeping bentgrass for that matter, than there are stars in the universe. The point of this exercise is to illustrate the importance of management of your young seedling plants during establishment. If, for example, you plant creeping bentgrass, which possesses 6 million seeds per pound, at a recommended rate of say 1 lb. per 1,000 ft$^2$ on an average sized golf course putting green of 5,000 ft$^2$, then your initial establishment will give you 30 million genetically unique seedlings. Over time, it is unrealistic to believe that all 30 million seedlings will survive. Some seedlings will succumb to disease, other will die from heat or cold, and many will simply be outcompeted by their neighboring brothers and sisters. There is immense competition for the limited resources of light, nutrients, water and simply space to grow on a golf course putting green. Therefore, over time, those 30 million seedlings will be reduced to some lower number, maybe thousands or maybe hundreds. In addition, the surviving plants will very often tend to look very different from one another due to their genetic uniqueness. This is one explanation of how and why putting greens tend to segregate over time into a network of patches (Photo 2).

**The maintenance factor**

However, the most important force for determining the level of competition and subsequent survival among these bentgrass seedlings is most likely the type and level of maintenance given by the turfgrass manager. Are these greens initially mowed at 1/8 inch or at 1/10 of an inch? Are these greens regularly cultivated, fertilized and irrigated, or are they kept lean and hard? These different management parameters have an extremely important impact on the final composition of the resulting bentgrass population because the genetically unique individuals will have different abilities to respond to different levels of management. For example, some individuals will tolerate lower mowing heights better than others, some will respond more to increased levels of nitrogen fertilizer than others, some will tolerate traffic more than others, etc. And thus, the original seedling population, which initially started at 30 million plants, will be steadily winnowed down to a much-reduced number of plants depending on the level and type of management received.

---

**Typical Northeast Lawn Mixture: LOT NO. PSU-1-100**

<table>
<thead>
<tr>
<th>SEED VARIETY</th>
<th>PURE SEED % by wt</th>
<th>GERMINATION</th>
<th>Pure Live Seed and % of mix</th>
<th>Number of seeds per pound</th>
<th>Percent of each species by number of pure live seed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Ryegrass</td>
<td>60%</td>
<td>90%</td>
<td>54% (54/87) = .621</td>
<td>.621 x 237,000 = 147,177</td>
<td>102,550/438,927 = 0.234 Or 23.4%</td>
</tr>
<tr>
<td>Fine Fescue</td>
<td>30%</td>
<td>85%</td>
<td>25.5% (25.5/87) = .293</td>
<td>.293 x 350,000 = 102,550</td>
<td>189,200/438,927 = 0.431 Or 43.1%</td>
</tr>
<tr>
<td>Kentucky Bluegrass</td>
<td>10%</td>
<td>75%</td>
<td>7.5% (7.5/87) = .086</td>
<td>.086 x 2,200,000 = 189,200</td>
<td>147,177/438,927 = 0.335 Or 33.5%</td>
</tr>
<tr>
<td>Total</td>
<td>—</td>
<td>—</td>
<td>87</td>
<td>438,927</td>
<td>100%</td>
</tr>
</tbody>
</table>

The percent by weight compared to the percent by number of a typical Northeast lawn seed mix containing Kentucky bluegrass, perennial ryegrass and fine fescue.
Additionally, once a particular genotype has been eliminated from the population, it cannot be resurrected because turfgrasses like creeping bentgrass do not typically flower and set seed underneath our mowing heights. Thus, if management practices are abruptly changed, after say 10 years, to a different level of intensity, then the genotypes best adapted to the new management practices might have already been eliminated from the existing population. And once these individuals are gone, they are gone, never to come back again.

It is at this point when my students typically ask, “But what about overseeding?” Well, in some cases overseeding can add or replace lost genetic variation, but in the case of creeping bentgrass, it is surprising to me how little genetic variation can actually be added through overseeding (see: Sweeney, P. and K. Danneberger. 1998. Introducing A New Creeping Bentgrass Cultivar Through Interseeding: Does It Work? It sounds like a good idea, but there are drawbacks. USGA Greens Section Record Sept-Oct 1998. Pp. 19-20.). Thus, the point of all this is for superintendents to know and value their seedling population and to appreciate the fact that their management techniques will greatly influence the resulting plant population for a long, long time to come.

This same principle described above also holds true for home lawns and landscape turf. However, for lawn and landscape turf, the seed numbers game is initially more important during the act of initial establishment. This is because most lawn and landscape turfs are established as a mixture of different species, the most common of which in the Northeast is a mixture of Kentucky bluegrass, perennial ryegrass and fine fescue. The important point here is that these three species have very different sizes of seed and that the available information on the seed label provides only the percentage of each type of seed by weight. Thus, when calculating out the final composition of species in the final product (the lawn itself), the Pure Seed component that is listed on the seed label as percent by weight of each species, in combination with PLS, must be converted to percent by number. This is because each pure live seed, regardless of its weight, gives rise to an individual seedling plant, and thus, the numbers are often very, very different.

As can be seen in Table 1, the number of Pure Live Seed per pound of each species is very different than the amount of Pure Seed that is listed on the seed label as a percent by weight. For example, as a percent by weight, Kentucky bluegrass only registers 10% of the above bag of seed. Moreover, when the percent germination is included into the calculation in order to determine PLS, Kentucky bluegrass is only 7.5% of the seed mix. However, when we take into account that Kentucky bluegrass has 2.2 million seeds per pound, then the final species composition of the resulting lawn is a whopping 43.1% Kentucky bluegrass. This example demonstrates the importance of knowing about the effect that seed numbers have on establishing various turfgrass species.
Continuing our tradition of innovation in turfgrass seed for over 80 years and bringing top-rated varieties and service to turf professionals around the world.

OVER 80 YEARS

For more information or nearest Jacklin distributor visit www.jacklin.com or call 1.800.688.SEED

Jacklin is a registered trademark of the J.R. Simplot Company © 2015 J.R. Simplot Company. All rights reserved
Control of Perennial Grass Weeds in Non-Mowed Stands of Fine Fescue

Naturalized grass swards on institutional grounds and golf courses can reduce mowing costs and impart a more natural appearance to the property. However, weed encroachment into these areas can compromise aesthetic appeal of the stand and increase costs associated with weed control. Field studies were conducted during 2015 in University Park to evaluate chemical control of five perennial grass weeds in mature stands of non-mowed fine fescue. Three herbicides — Segment (sethoxydim), Fusilade II (fluazifop-P-butyl) and Tenacity (mesotrione) — were applied to quackgrass, wirestem muhly, creeping bentgrass, volunteer Kentucky bluegrass and tall fescue during the summer.

Segment (3.75 pints product/A) showed strong suppression of volunteer Kentucky bluegrass and tall fescue, but it gave only moderate suppression of wirestem muhly following two applications 30 days apart in July and August.

Fusilade II controlled creeping bentgrass with a single application at 24 fl. oz. product/A + a nonionic surfactant, but it caused only moderate suppression of wirestem muhly after two applications at the same 24 fl. oz. product rate. Fusilade II strongly suppressed quackgrass following two applications in early summer.

Of the three herbicides, Tenacity + a nonionic surfactant was most effective at suppressing wirestem muhly at both 5 and 8 fl. oz./A + a nonionic surfactant after two applications in July and August. All three herbicides showed excellent safety on non-mowed creeping red fescue and Chewings fescue.

Update submitted by Pete Landschoot, Professor of Turfgrass Science, and Matt Naedel, Research Technician, Penn State University.
Increase your social media awareness and grow your business in all the right circles.

Social media marketing is leading the way today’s companies are reaching potential and existing customers. Marketing online is no longer just left to websites and emails—it now must encompass a well-executed plan spanning the most popular social media platforms, or run the risk of allowing competitors to steal the spotlight.

Most companies, though, don’t have time to populate and maintain a consistent online presence or the resources to hire someone to do so. That’s why Leading Edge Communications has created social media marketing services to serve this important consumer niche.

We’ll connect you with customers through a combination of social media platforms such as Facebook, Twitter, Instagram, Pinterest, LinkedIn and blogs. We’ll improve your search rankings through a more organic search engine optimization plan. Our team of social media experts will even manage services such as answering comments and questions, publicizing events and products, and responding to reviews and feedback. Leading Edge Communications will become your social media marketing partner, working alongside you and your team, helping keep current customers up-to-date, while introducing new customers to who you are.

Simply put… social media is where customers are, and it’s where businesses of any size need to be. Find out more about our social media marketing services and let’s discuss the right circles you need to be in.

Leading Edge Communications

info@LeadingEdgeCommunications.com | www.LeadingEdgeCommunications.com | 615.790.3718
Long-time Keystone Athletic Field Managers Organization board member Steve LeGros, president of Le Grows, Inc., a turfgrass and event-management consulting firm, has served as a principal member of a group of professionals tasked with renovating the National Mall in Washington, DC.

- The National Mall, an official national park, has been loved to death. Each year, the Mall hosts 25 million visitors and 3,000 special events. Few public spaces can compare with its grandeur, intensity of use and cultural symbolism. Though the U.S. National Park Service has spent decades cultivating the lawn, its condition had deteriorated.

- The Mall, primarily turf and tree landscape, is more than 60 acres and is described as “the nation’s front yard.” It includes areas that are officially part of West Potomac Park and the Constitution Gardens to the west, and it often is taken to refer to the entire area between the Lincoln Memorial and the U.S. Capitol, with the Washington Monument providing a division slightly west of the center.

- The National Mall is a highly desirable lawn area for all kinds of uses and has been typically scheduled for over 800 days of permitted use per calendar year. As a result, the health of the turfgrass and the soil’s conditions deteriorated. With this large number of permitted activities, the necessary maintenance practices could be done only every other year. This approach was not effective.

The National Park Service decided four years ago to invest in a major multi-phase turfgrass, drainage, soil and irrigation restoration project. They then compiled a team of consultants from the turfgrass industry to achieve the goal of sustainable, high-performance turf.

The renovation and design are similar to systems used on professional sports fields, including wear-tolerant turfgrass varieties, engineered soils, drainage, irrigation and cisterns. The top 18” of soil were enhanced with a mixture of coarse sand and compost, to alleviate compaction and increase water permeability. Panels were raised 2” higher than the surrounding walkways and each panel was edged by a granite curb-and-gutter system to channel rainfall runoff into underground concrete cisterns, which supply water for the new, more-durable irrigation system.

LeGros also co-authored a new, 1,000+ page manual that was created to cover the operations and maintenance of all the components in the restoration, along with event-management guidelines on turfgrass. That team was led by HOK, the global design, architecture, engineering and planning firm. The manual sets out standards to protect both the Mall’s signature turf character and the significant investment. Developed in consultation with turf experts, the manual incorporated best practices and new information; it establishes a different approach to resource protection and maintenance procedures.

The Mall restoration team also
included Dr. Pete Landschoot from Penn State, who identified types of grass that can withstand the National Mall’s heavy use and irrigation systems that are durable and environmentally sound. The design solutions alleviate soil compaction and provide proper air, water and nutrient infiltration. The plan replaces subsoil and surface soil with an engineered soil that is permeable, effective for plant growth and that retains water within its subsurface structure.

LeGros says, “We started writing the scope of work in spring 2010, which involved dozens of meetings and debates with the magnitude of selections that had to be made. The project defines sustainable strategies for maintaining healthy soils and turf on the National Mall. It improves stormwater absorption and maintains existing vegetation while preserving the iconic quality of this historic landmark.

“Shortly after Phase 1 that included 11 acres was completed in fall 2012, the Presidential Inauguration was held in January 2013, with hundreds of thousands of spectators on the turf, which performed great,” said LeGros. “Since then there have been many more large concerts and other large events on this area, and we are very happy. With all this said, the real credit goes to the onsite turfgrass manager, Michael Stachowicz. It was made very clear from the beginning that the success of the renovated turf — no matter what expertise, engineering or science we throw at it — if there wasn’t a qualified turfgrass manager hired to oversee the restored turf, ‘all was for not.’ I have had the pleasure of working with Mike on numerous events on the Mall, and he has done an outstanding job.”

LeGros said Phases 2 and 3 are underway presently and are slated to be completed in fall 2016, just in time for the next Presidential Inauguration. This work will include:

- Excavating 4’ of the existing soil
- Adding cisterns to capture rainwater, and then recycle one million gallons back into the turf irrigation system, which will be designed similarly to golf course fairways
- Adding drainage on 15’ centers, laid in pea gravel
- Selecting soil that will drain properly and yet will be able to withstand the millions of visitors to the lawn annually, a native soil/sand/compost blend
- Installing perimeter surface drainage
- Putting down big-roll, turf-type, three-way-blend tall fescue

“In my twenty-nine years in turfgrass management, I have been very fortunate to have been involved with many memorable sporting and concert events, but without a doubt, I consider it an honor and a privilege to be a part of this historical project and to have helped to make a difference,” LeGros said.
In Memoriam

Keith Allen Happ

October 7, 1957 – October 27, 2015

By Jason M. Hurwitz, 2013–2014 PTC President

Keith A. Happ passed to the fields of turf eternal in late October. Together, we mourn the loss of a friend, mentor and leader — a man of character and integrity.

Keith grew up in northeast Ohio and began his career ascending to golf course superintendent at Legend Lake Golf Course in Chardon, OH. His hard work and dedication drove him to participate in the industry, serving on the board of directors for the Northern Ohio Superintendents Association and the GCSAA Public Relations Committee. His tenure as superintendent culminated with the achievement of Certified Golf Course Superintendent status. Following his eighth year in that role, Keith enlisted in graduate studies at the Ohio State University while continuing his passion for turfgrass management, working on the grounds crew at Double Eagle Golf Club. With a B.S. in Agronomy in hand, Keith’s mastery of the trade, keen ability to communicate effectively and tireless work ethic deservedly earned him the role to which he dedicated the subsequent 22 years of his career. Keith joined the USGA Green Section on January 4, 1993, and immediately began to forge the strong personal and professional bonds that endeared him to us all.

Keith served the majority of his USGA career as Green Section agronomist in the Mid-Atlantic region. He dedicated himself to the turf industry and left indelible impressions throughout. It was in this service that Keith felt most rewarded. Whether working late hours at a championship venue or volunteering personal time to a local ball field, his passion for the turf industry and his love for the game of golf were undeniable. Never resigned to defeat and always willing to help, Keith was a partner through the annual victories and defeats ever present in this industry.

Though always armed with solutions, Keith knew when to listen and when to act. In this manner, he mentored all. Whether with someone 10 years his senior or a first-year turf manager, Keith taught all in his presence with a tact that earned trust and cemented his reputation. This skill enabled him the opportunity to influence countless careers; whether via turf consultations or whether via recommendation at selection committee meetings, he facilitated many. One of Keith’s closest peers recently summarized this well when he described Keith as the “parent of his career.”

Keith Happ challenged life with vigor and passion. The Happ family has asked that anyone touched by Keith, honor him in the good work you perform. Pour vigor and passion into your work, and Keith will surely be smiling. In his final lesson to the industry, he taught us that professionalism and passion are boundless.

Keith requested all who cared for him to remain celebratory. Knowing this was a difficult request, Keith arranged for a 21-club salute. Enacted on the grounds of Scioto Country Club, Keith’s memorial was a moment of triumph. On a sunny, crisp yet warm fall afternoon in November, one in which he no doubt would have reveled, 21 of Keith’s closest friends and family together launched 21 golf balls forth, skyward toward turf eternal. In doing so, everyone in attendance celebrated that which Keith knew — life is enjoyed one moment at a time, and love is universal. And for that, we are all indebted to Keith. We miss you, Keith.
Penn State Turf Team

**Jeffrey A. Borger**  
Senior Instructor in Turfgrass  
Weed Management  
814-865-3005  
jborger@psu.edu

**Michael A. Fidanza, Ph.D.**  
Professor of Plant & Soil Science  
610-396-6330  
maf100@psu.edu

**David R. Huff, Ph.D.**  
Professor of Turfgrass Genetics  
814-863-9805  
drh15@psu.edu

**John E. Kaminski, Ph.D.**  
Associate Professor of Turfgrass Science  
814-863-3007  
jek156@psu.edu

**Danny Kline**  
Research Technologist in Turfgrass Entomology  
814-863-1669  
dek16@psu.edu

**Peter J. Landschoot, Ph.D.**  
Professor of Turfgrass Science  
814-863-1017  
pjl1@psu.edu

**Ben McGraw, Ph.D.**  
Associate Professor of Turfgrass Entomology  
814-865-1138  
bam53@psu.edu

**Andrew S. McNitt, Ph.D.**  
Professor of Soil Science  
814-863-1368  
asm4@psu.edu

**Max Schlossberg, Ph.D.**  
Associate Professor of Turfgrass Nutrition / Soil Fertility  
814-863-1015  
mjs38@psu.edu

**Al J. Turgeon, Ph.D.**  
Professor Emeritus of Turfgrass Management  
aturgeon@psu.edu

**Wakar Uddin, Ph.D.**  
Professor of Plant Pathology  
814-863-4498  
wuxu2@psu.edu

Advertiser Index

- Aer-Core, Inc........................................5  
  www.aer-core.com
- Central Sod Farms of Maryland, Inc...........21  
  www.centralsodmd.com
- Covermaster, Inc.................................5  
  www.covermaster.com
- CoverSports USA...............................11  
  www.coversports.com
- Ernst Conservation Seeds....................11  
  www.ernstseed.com
- FM Brown’s & Sons..............................14  
  www.fmbrown.com
- George E. Ley Co...............................21  
  www.gelcgolf.com
- Jacklin Seed, A Division of Simplot.........15  
  www.jacklin.com
- Leading Edge Communications...............17  
  www.LeadingEdgeCommunications.com
- Lebanon Turf.................................Back Cover  
  www.lebturf.com
- Medina Sod Farms, Inc.......................21  
  www.medinasodfarms.com
- Pennsylvania State University.............Inside Front Cover  
  www.psu.edu
- Progressive Turf Equipment, Inc............7  
  www.progressiveturfquip.com
- Quali-Pro.......................................3  
  www.quali-pro.com
- Seedway, LLC..................................14  
  www.seedway.com
- Shreiner Tree Care............................21  
  www.shreinertreecare.com
- Smith Seed Services.........................21  
  www.smithseed.com
- The Fertrell Company.........................Inside Back Cover  
  www.fertrell.com/soilcareproducts.htm
- Walker Supply, Inc............................21  
  www.walkersupplyinc.com

Calendar of Events

**January 19–22**  
STMA Conference and Exhibition  
San Diego, CA

**January 25–28**  
M-A-T-E  
Mid-Atlantic Turfgrass Expo  
(a joint conference between the Maryland Turfgrass Council and Virginia Turfgrass Council)  
Fredericksburg Expo & Conference Center  
Fredericksburg, VA

**January 28**  
Northeastern PA Turfgrass Conference & Tradeshow  
Woodlands Inn and Resort  
Wilkes Barre, PA

**February 6–11**  
Golf Industry Show  
San Diego Convention Ctr.  
San Diego, CA

**February 19**  
20th Annual KAFMO Athletic Field Conference  
Holiday Inn Harrisburg/Hershey  
Grantville, PA

**February 22–25**  
TPI International Education Conference & Field Day  
(Turfgrass Producers Intl.)  
Hyatt Regency Houston  
Houston, Texas

**February 23–25**  
**Please Notice**  
* New Venue Location *  
Western PA Conference and Tradeshow  
Has been relocated to:  
Doubletree By Hilton (formerly The Radisson)  
101 Mall Boulevard  
Monroeville, PA 15146  
412-373-7300
Growing Great Turf Naturally Since 1946

- **Turf Pro**
  Thickens turf and builds the root system

- **Liquid Fertilizer**
  Stimulates soil biology and provides primary and trace nutrients

- **Liquid Kelp**
  Helps reduce herbicide use and act as a bio stimulant

- **Soil Mineralizer**
  Provides trace minerals, salt and sulfur to maintain healthy root development

- **Aragonite**
  High in readily available calcium

- **WeedBan**
  Natural pre-emergent weed control

The Fertrell Company • phone: 800-347-1566 • www.fertrell.com
INTRODUCING
ProScape® Fertilizer with Acelepryn plus Dimension.

LebanonTurf now offers our industry-standard controlled release ProScape fertilizer with Acelepryn insecticide plus Dimension herbicide. It’s a one-two-three punch that delivers beautiful dark green color while providing effective, season-long control against grubs and crabgrass. One granular application in the spring protects your golf course for the year.

It’s all about time ... using it, saving it.