Southeast

Lambert McCarty, professor of agricultural, forest and environmental sciences at Clemson University, has a list of winter annuals that will rear their ugly heads in the spring. Included on the list are annual bluegrass, henbit, hairy bittercress, annual blueeyedgrass, wild onion/garlic, henbit/purple deadnettle and Carolina geranium. Summer annuals such as crabgrass and goosegrass also present problems for\ superintendents in the region.

Hairy Bittercress

For identification, McCarty recommends using the 'Color Atlas of Turfgrass Weeds.'

Florida

In Florida, USGA Green Section senior agronomist Todd Lowe sees goosegrass on his radar.

"It's a perennial problem on most Florida golf courses, but there are a variety of herbicides to manage it," he says. "Tropical signalgrass has emerged as one of the most difficult weeds to control, due to the loss of MSMA."

Signalgrass

Having dealt with goosegrass before, most superintendents have no trouble with identification. But, he adds, "tropical signalgrass is a little more difficult to identify because it looks similar to crabgrass. It forms thick mats, unlike most crabgrass, but the distinctive difference between tropical signalgrass and crabgrass is in their seedhead morphology."

Lowe suggests to look carefully for those seedheads: "Crabgrass seedheads somewhat resemble a hand, whereas signalgrass seedheads hang off the main stem at a 90-degree angle, like a signal flag."

Growing a healthy stand of turfgrass is one way to avoid weeds, but you may also want to stop overseeding in the winter.

"Overseeding with perennial ryegrass creates thin and bare areas in spring," Lowe says. "These bare areas are then colonized by other plants and weeds as the Bermudagrass recovers."


Bull paspalum

Northeast

James Skorulski, senior agronomist in the Northeast Green Section, says annual grasses receive the most attention in the region and are usually targeted with preemergent products.

"Crabgrass populations seem to be spreading to northern parts of New England and Canada," Skorulski says. "Goosegrass is becoming more prevalent in recent years with the warm summers. It seems to be working its way further north and remains most common along cart path edges and other areas of compaction. It's also becoming evident in some practice tees and other areas.

"There are the regular broadleaf weeds such as dandelion, plantain, prostate knotweed, and clover," he adds. "The other weeds that are becoming more prevalent, especially in coastal and southern parts of New England, are green and false green kyllinga and bull paspalum."

Aside from paspalum, which can be confused with crabgrass, these weeds are fairly easy to identify, says Skorulski. Paspalum – usually found in dryer areas like roughs and bunker banks – is a perennial unaffected by preemergent herbicides. Kyllinga may be confused with nutsedge, but it's much more aggressive and tends to form mats.

Northwest

The Northwest Green Section, headed by director Larry Gilhuly, sharply contrasts with the abundance of weed varieties in the Northeast. In the Pacific Northwest, Gilhuly sees clover, dandelion, and other broadleaf weeds. In Hawaii, it's all goosegrass, smooth crabgrass, and torpedograss, which are problematic year-round. In all these cases, he says, the weeds are fairly easy to identify and diagnose.

North-Central

The worst weed offenders in this region are dandelion and clover, says Robert C. Vavrek, Jr., senior agronomist in North-Central Green Section. Luckily, both are easyily identified.

"There are good weed identification keys on a number of university turf management websites," he says.

Treatment

Once dandelions are identified, Vavrek says, most superintendents will treat them curatively. Some treat crabgrass preventively,

PHOTO COURTESY OF USDA

Good Vs. Bad Turf

New turf seed varieties are being introduced to best suit different environments across the country. Have these led to new weed varieties as well? In a word, no.

"I have not seen, nor do I anticipate, any of the new varieties of turf being associated with new weeds," says Elliott L. Dowling, agronomist with the Mid-Atlantic Green Section. "In fact, I would go so far as to say that the new varieties of turf may help eliminate weed pressure.

"Newer varieties, such as Latitude 36 Bermudagrass, are suited for the Mid-Atlantic climate," he adds. "This is a good alternative for those who are managing P. Rye. In summer, Latitude 36 will be actively growing, providing a uniform stand of turf which can reduce the risk of weeds germinating."

That's not to say that it will be business as usual for superintendents, says Kai Umeda, area turfgrass extension agent for the University of Arizona.

"New and improved Bermudagrasses lead to new management strategies, i.e. more verticutting or aerifying that can stir up weeds to germinate," he says. "But tighter and denser turfs can also prevent weeds from emerging.

"Longer surviving ryegrass can allow summer grass weeds to establish themselves if postemergence herbicides are less selective compared to the safety of Bermudagrasses," he says. "Longer surviving ryegrasses are becoming more difficult to eliminate through the summer and re-establish in the fall for the winter," he says. "Sulfonylurea herbicides work well to eliminate them in the winter in non-overseeded areas in dormant Bermudagrass.

Lambert McCarty, professor of agricultural, forest and environmental sciences at Clemson University, says several weeds are becoming more of an issue in the southeast (i.e. tropical signalgrass, doveweed.) But, he adds, this is not related to new and improved turfgrasses.

"This has been generally related to herbicide use pattern changes, specifically the use of MSMA," McCarty says. "As MSMA use has decreased, weeds which generally would be controlled have become more of an issue."

Listen in! Goosegrass is notorious on golf courses, and develops resistances quicker than many other weeds. Dr. Jason Fausey, regional field market development manager for Valent Professional Products, shows how to stop it now. Enter **bit.ly/1qq6PIg** into your browser to access this Superintendent Radio Network podcast.

while others wait to control crabgrass with herbicide after it germinates.

Of course, an ounce of prevention is worth a pound of cure.

"Fall treatments for perennial weeds will lessen weed pressure during spring," says Vavrek, acknowledging the difficulty superintendents often face in getting on the course early in the season. "Many treat for dandelions too early. The weeds are not growing rapidly enough to absorb a lethal dose of herbicide. The weeds are stunted for a while, but they will recover."

Dowling also finds preventative measures to be the most effective, pointing out that it is difficult to maintain control if you try to apply products curatively.

"Eliminate and control as many weed species as possible before they become a problem on your golf course," he says. "The best method to control spring weeds is kill them in the fall. The more you can do in the fall, the less the spring outbreaks may be. Additionally, focus on the health of desirable plants. Providing complete coverage will reduce the likelihood of weed species germinating. Use desirable turf to out-compete weeds."

Preventative control boils down to knowing what your weed problems are in advance, says Bevard.

"Summer annual grasses (crabgrass, goosegrass, etc.) should be controlled with a preemergent herbicide with an early spring timing if pressure from these weeds is high," he says. "If there is low pressure from crabgrass and goosegrass, some superintendents opt for spot treatments with post emergence heribicides.

"If you have broadleaf weeds such as clover and dandelion, herbicide applications can be made in the fall to eliminate most of the problems," he adds. "Then you do not have to deal with the problem in the spring, or at least the problem is far better than it would be otherwise."

Still, according to McCarty, many curative options do exist.

"Winter annual weeds are easier to control with postemergence herbicides in our region because Bermudagrass is often not actively growing when these weeds are present," he says. "In contrast, crabgrass and goosegrass are more difficult to control because of the lack of selectivity of postemergence herbicides which control these weeds. Of course, if the facility is overseeded, this complicates the situation considerably."

Lowe balked at the idea of completely ridding a course of weeds. "Terms like 'elimination' and 'eradication' should not be considered. There's only 'weed management.' The soil seedbank on most golf courses is very high, and many weed seeds can lie dormant for decades. If given the right opportunity, seeds can germinate and establish quickly in a subtropical environment," he says.

"Weed management begins with strong, dense turf. The best defense is a good offense." **GCI**

Rob Thomas is a Cleveland-based writer and frequent GCI contributor.

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NO "FUN" IN FUNDING

John Kaminiski explores the rigors of securing research dollars for turf.

When I discuss research programs with most people outside of academia, it is clear that many don't really understand the full concept of research funding; both in terms of where the funds come from and how they're used. With funding streams to turfgrass programs around the country dwindling, it's time to shed some light on this process and address some potential implications to our industry.

WHERE DOES THE MONEY COME FROM? That's the million-dollar question. Funding for turf programs – particularly those of an applied nature that can actually benefit those of you reading this article – is dramatically down across the county. It doesn't matter if we are referencing large granting organizations like the USDA and National Science Foundation, national associations like the GCSAA and USGA, companies that pay to evaluate their products, or your local golf associations and turf councils.

LARGE GRANTING OPPORTUNITIES. From a university perspective, the importance of applying for (and hopefully landing) large-scale competitive grants is heavily stressed. Unfortunately, these grants are few and far between even for those doing the most fundamental science. Put the word "turfgrass" into the grant and it gets even harder to successfully get a grant funded. Make the proposal applied in nature and you can basically kiss your chances goodbye.

While the percentage of turfgrass academics receiving these large grants is minuscule, pressure is still placed on researchers – especially young, tenure-track faculty – to spend countless hours writing and applying for them. Perhaps it's for the prestige it brings to the university and the program, the large sums of funding relative to traditional turfgrass funding opportunities, or the large portion of these grants that goes directly to the university in the form of the "in directs."

NATIONAL ASSOCIATIONS. This is a tricky one to write about. You never want to bite the hand that feeds you, but the reality of the situation is that organizations like the GCSAA and USGA provide very little in the way of funding for turfgrass research.

> "If we look at a "successful" research program that has a technician, one Ph.D. student, two M.S. students, and all of the expenses that go along with that you will see that it adds up. A quick estimation for the above program could cost as much as $200-250k annually."

The GCSAA has come under fire from academics in recent years due to the drop off in funding to support research benefitting its members, as well as the loss of select personnel that helped connect academics with the association.

Although some of these issues have more than ruffled a few feathers, these organizations – like many – simply don't have the resources to put back into research and/or have decided to put those resources into other programs. I can't begin to fully understand the decisions being made and have to assume they are doing what's best for their organization.

Regardless of the reasoning behind these moves, the bottom line is the funding is simply not there.

LOCAL TURF ASSOCIATIONS. This is an interesting one. These groups are usually run by a handful of select and dedicated volunteers whose sole purpose is to make sure the turf programs in their regions are supported. I am thankful that during my career I have been fortunate to have my research supported by local groups like the Pennsylvania Turfgrass Council, Tri-State Turfgrass Association, the New England Regional Turfgrass Foundation and various local turfgrass chapters.

While their support helps offset the exorbitant cost of research, they obviously can't always fund large-scale projects involving multiple graduate students, technicians, and expensive equipment and research protocols. Having said that, they are a tremendous resource.

INDUSTRY SUPPORT. While not everyone involved in research is supported by R&D dollars from large companies, there is no doubt these funds plays a large role in funding many programs. The funds made available for the evaluation of pest control products, discovery of novel technology, and the performance testing of new turfgrass species is critical to keep many

programs viable. These funds are often used to support additional basic research projects where competitive funding could not be secured.

HOW MUCH MONEY DO YOU REALLY NEED? I hear that asked a lot from superintendents. I love to answer this question because, in most cases, the superintendent on the other end of my soapbox speech sits there with eyes wide in amazement of what it takes to run a successful research program.

TECHNICIANS. Let's begin here. Technicians are the backbone of many research programs if you're fortunate enough to have one. In the past, "hard money" technicians (paid by the university) were fairly common and researchers could focus on spending their grant money in other areas. In recent years, however, the costs have been passed on to the researcher. This includes salaries and benefits, as well as other associated costs. In general you can expect to pay $45-70k+ for a technician. Money well spent if you're lucky enough to have a good technician.

GRADUATE STUDENTS. Grad students are among the most important asset in any research program. Working under the direction of the PI (principle investigator), graduate students are the ones in the trenches conducting the day-to-day activities of an individual project, spending hours tediously collecting data, and pulling the entire project together into a coherent thesis or dissertation. A typical M.S. or Ph.D. student is likely to spend 2 to 3 or 4 to 5 years completing a research project, respectively. Each graduate student comes at an average cost of approximately $35-40k per year. This doesn't include additional expenses associated with the individuals and their projects.

OTHER EXPENSES. In addition to labor, researchers must pay for a variety of other expenses to keep a program afloat. These can include charges for lab and field space, manuscript fees (yes, we actually have to pay to publish our research in most scientific journals), vehicles, equipment and supplies, travel costs, and other miscellaneous expenses. Another fun fact…did you know that most universities require 48 percent to as much as 60 percent of a total grant be allocated towards indirect costs paid directly to the university?

If we look at a "successful" research program that has a technician, one Ph.D. student, two M.S. students, and all of the expenses that go along with that you will see that it adds up. A quick estimation for the above program could cost as much as $200-250k annually.

Feeding all of those mouths comes at a personal sacrifice, as well. Many universities hire new faculty on a "9-month" appointment with the expectation that the researcher will write grants in which they include their "summer salary" into the proposal. Unfortunately, most groups funding turf research have provisions that do not allow for this type of compensation to the PI and instead limit funding to technician or graduate student salaries. Many (dare I say most) faculty sacrifice their own summer salaries to make sure funding is in place to keep their program operating at full capacity.

WHAT'S THE SOLUTION? I have no clue. I continue to fight for every dollar that comes into my program in an effort to attract the best graduate students and provide real solutions to superintendents and the turfgrass industry. I also fully admit that if it wasn't for funding from some of the groups I mentioned above that I wouldn't have been able to successfully complete my graduate studies and may have been less successful when submitting my tenure packet only a few years ago.

Superintendents must continue to push their national organizations to provide funding for research projects that benefit them. They must volunteer within their local associations to ensure funding is available to researchers in their region and give their time to serve on boards and research committees to direct the limited resources to projects that will yield the greatest impact.

Perhaps my biggest concern with limited research dollars is the impact it will have on turfgrass programs and young faculty. Resources at the university level are scarce. Vacant positions created by retiring faculty are being lost to disciplines where funding is on the rise and the turf industry isn't exactly in an economic peak at the moment. We are also seeing a trend in which many academics and recent doctoral graduates are seeking positions within the industry instead of academia. Finally, those young scientists who choose academia are finding it more difficult to obtain those competitive grants so desperately needed to successfully navigate the tenure process.

Research dollars aren't just about solving the latest problems superintendents face. The funding dilemma is much larger than that. Solutions to problems, training of graduate students, hiring new faculty and all of the things associated with or reliant upon research funding are at the very heart of this issue. While I can't expect every turf organization to direct all of its resources into research, those whose goal is to support the industry should look closely at the level of support they are providing academia relative to the level of support they are extracting from it. **GCI**

Get Out, Damn Spot!

Record lows this winter won't force superintendents to alter their standard dollar spot programs.

By Jason Stahl

It's been a brutally cold and snowy winter, with most areas of the country seeing temperature records shattered like falling icicles. Ohio, for example, had more sub-zero days in January than in any month in the past 20 years.

So, what does this mean for dollar spot pressure in the spring? Not much, says Jim Kerns, assistant professor and extension specialist for turfgrass pathology at North Carolina State University. Kerns experienced the pathogen's hardiness firsthand during his time at the University of Wisconsin, where he studied dollar spot's overwintering.

In his studies, Kerns found that "while it did seem to show that winter temperatures have an association with winter survival, it

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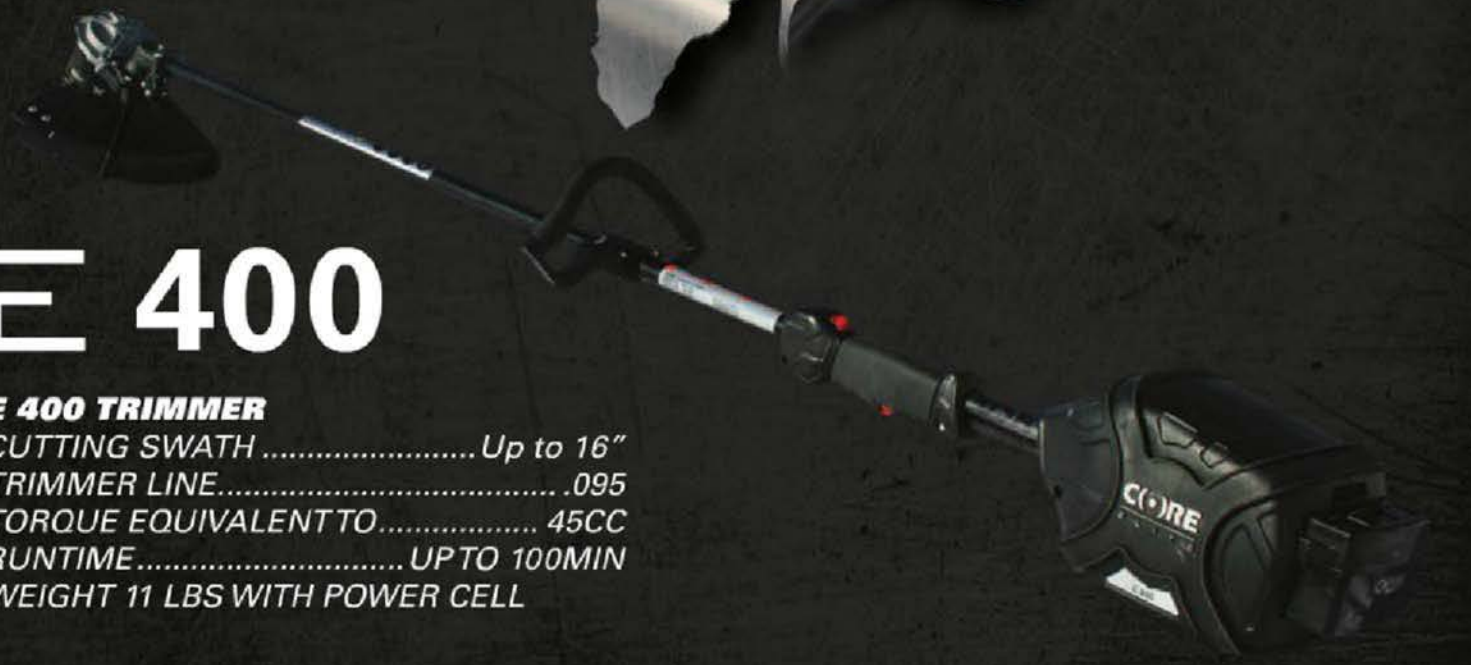

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Want more information about dollar spot? Check out this podcast from Dr. Karl Danneberger, professor at The Ohio State University. In the podcast, Danneberger shares the warning signs for dollar spot and how superintendents can identify it on their courses. Just enter **bit.ly/NCVdDd** into your web browser.

does seem the organism can survive pretty well over winter, even with subzero temperatures."

Kerns believes that winter isn't the best judge of how pathogens work in different seasons because these fungi are capable of surviving in different climates.

"Certainly, this winter will have some sort of effect, but I think that effect is going to be mild in the eyes of the practitioner," he says

In other words, it won't save any superintendents from using fungicide applications or changing their management practices.

"[The winter] may not back some of the survival of the organism, but once it gets going, you see an initial lag, then it grows exponentially if the environment is correct," says Kerns.

One of the reasons Kerns is leery of winter lessening the impact of dollar spot is that he has stored these fungi at -80 Celsius and still was able to pull them back out, plate them, and watch them grow just fine.

"They have a mechanism to withstand cold temperatures well," he says. "They may not be actively growing, but they can withstand extremely cold temperatures for long periods of time."

Based on work he has done in trying to forecast development of dollar spot, Kerns advises superintendents to consider their first dollar spot application when temperatures over 50 degrees Fahrenheit coincide with relative humidity above 70

Dollar spot is resilient to temperature extremes.

BAYER ENVIRONMENTAL SCIENCE

percent for at least five days.

"That could vary this spring, but not necessarily as a result of winter," says Kerns. "That's just whatever spring we're dealt this year. Looking at winter as a predictor for spring and summer – and I know a lot of people are thinking about this – I've never found it as a good prediction of what happens in spring."

According to Kerns, the disease is most severe when relative humidity reach 85 percent and above. Typically, the disease is not problematic when temperatures are 90 degrees Fahrenheit and above, but it still can cause disease at higher temperatures if relative humidity remains high.

Kerns' other piece of standard advice is to always plan for the norm.

"Don't assume based on fall conditions or winter conditions that your dollar spot application will be any different than last year," he says. "Typically, if you've had great control in years past, you'll most likely get great control in 2014 and years on. For courses that have struggled, it's time to re-evaluate what

Contact vs. Systemic

Fungicides can be broken down into two groups: contact fungicides and systemic fungicides.

According to Rob Golembiewski, Ph.D., member of Bayer Environmental Science's technical service team for turf and ornamentals, contact fungicides are applied to the plant surface and prevent fungus from developing on the leaf surface.

"It more or less inhibits the growth and development of the disease itself," says Golembiewski.

Systemic fungicides are generally taken up by the plant itself. Because of this, there is usually longer residual activity, around 14 to 28 days of control versus 7 to 14 with contact fungicides.

The biggest class of fungicides, says Golembiewski, is the DMIs. Within this class are six different products: Bayleton, Banner Maxx, Tourney, Torque, Trinity, Triton FLO and a new product from Bayer coming out in the spring called Mirage.

"The group most widely used in early season applications is DMIs," Golembiewski says. "When you get into the in-season, because of the higher temperatures guys look at contacts or non-DMI chemistry."

At the end of the day, Golembiewski says, it's a good thing that the market has such a wide variety of products.

"When you look at the amount of products and chemistries available, it's really nice as far as with dollar spot because you do have the opportunity to look at more of a solutions approach," he says. "It would be great if we were just dealing with dollar spot, but on a golf course, we all realize you're dealing with multiple diseases depending on what part of the country you're in. So you want to think about a different approach when it comes to dollar spot, anthracnose, brown patch or summer patch and start utilizing fungicides to target multiple diseases."

Expert advice

For more information on dollar spot and the issues related to managing and treating for this turf pathogen, check out the following articles. To access the content, just enter the following link into your browser.

A New Look at a Costly Problem
Research on fungicide resistance in dollar spot.
By Joseph Roberts
bit.ly/1bNama6

Dollar Spot Control
Treatment of this disease in creeping bentgrass fairway turf as influenced by fungicide spray volume and application timing.
By Steven J. McDonald, Peter H. Dernoeden, and Cale A. Bigelow
bit.ly/1aVytbx

fungicides they're using in combination with cultural management."

Kerns uses last summer as an example. It was a banner year for dollar spot because most of the country stayed pretty wet most of the year and didn't get too hot in most areas.

Likewise, North Carolina rarely has dollar spot in July and August, yet it had it all summer long.

"So if people did well last year with their dollar spot program, they'll likely do well this year," he concludes.

"What this year's pressure will be based on is what spring and summer holds. That's the main thing," Kerns adds. "Depending on spring, it certainly could be later or may not be as severe initially, but again it's difficult to predict based on winter temperatures."

Rob Golembiewski, Ph.D., member of Bayer Environmental Science's technical service team for turf and ornamentals, predicts no significant change as well in dollar spot pressure this spring.

"If anything, a milder winter would probably be more conducive to seeing activity earlier in spring," he says. "But the turfgrass went dormant in fall and we have had ample snow cover for the most part that has acted as an insulation blanket. So even with these extreme cold temperatures, the turf really hasn't been impacted that much."

Research coming out of Ohio State University suggests applying a DMI fungicide after the second true mowing of the year can delay the onset of dollar spot anywhere from 8 to 12 weeks into early summer. Bayer has an additional recommendation, Golembiewski says, based on its "total solution" approach.