TURFGRASS TRENDS

POA CONTROL

Controlling Your *Poa*

Integrating cultural practices, products and proper timing are necessary for control

By Bert McCarty

Annual bluegrass (*Poa annua* L.) is the most troublesome winter annual grass weed on golf courses. Its low-growth habit and unique ability to thrive in moist conditions and compacted areas make golf courses ideal candidates for invasion. This article focuses on postemergence control in established turfgrasses.

Non-overseeded fairways

A recent three-year study [*Postemergent Annual Bluegrass Control in Dormant Nonoverseeded Bermudagrass Turf*, HortScience 42(3):670-672] investigated various herbicides and timings for postemergence *Poa* control in dormant bermudagrass fairways. TranXit, Monument, Katana, Finale + Envoy, Finale alone, Kerb, Revolver, Finale + Roundup Pro, Roundup Pro + Reward, and Roundup Pro + Envoy treatments provided best control in April whether they were applied in late December or early February.

Roundup Pro alone provided better control when applied in February compared to December while Princep and Image were better when applied in Decem-

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PHOTO 1

Gradually, Poa encroaches into greens from untreated fairways.

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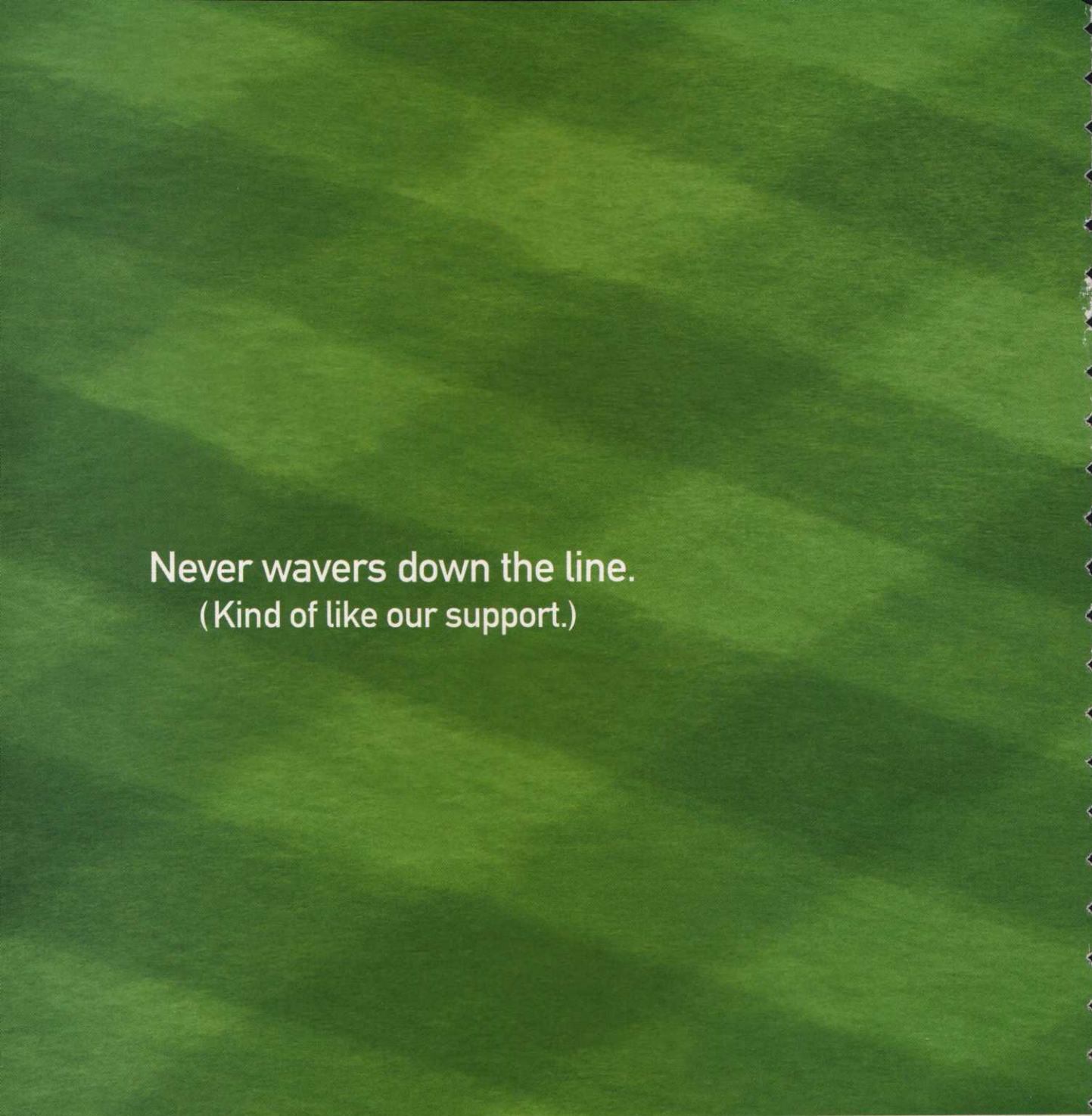

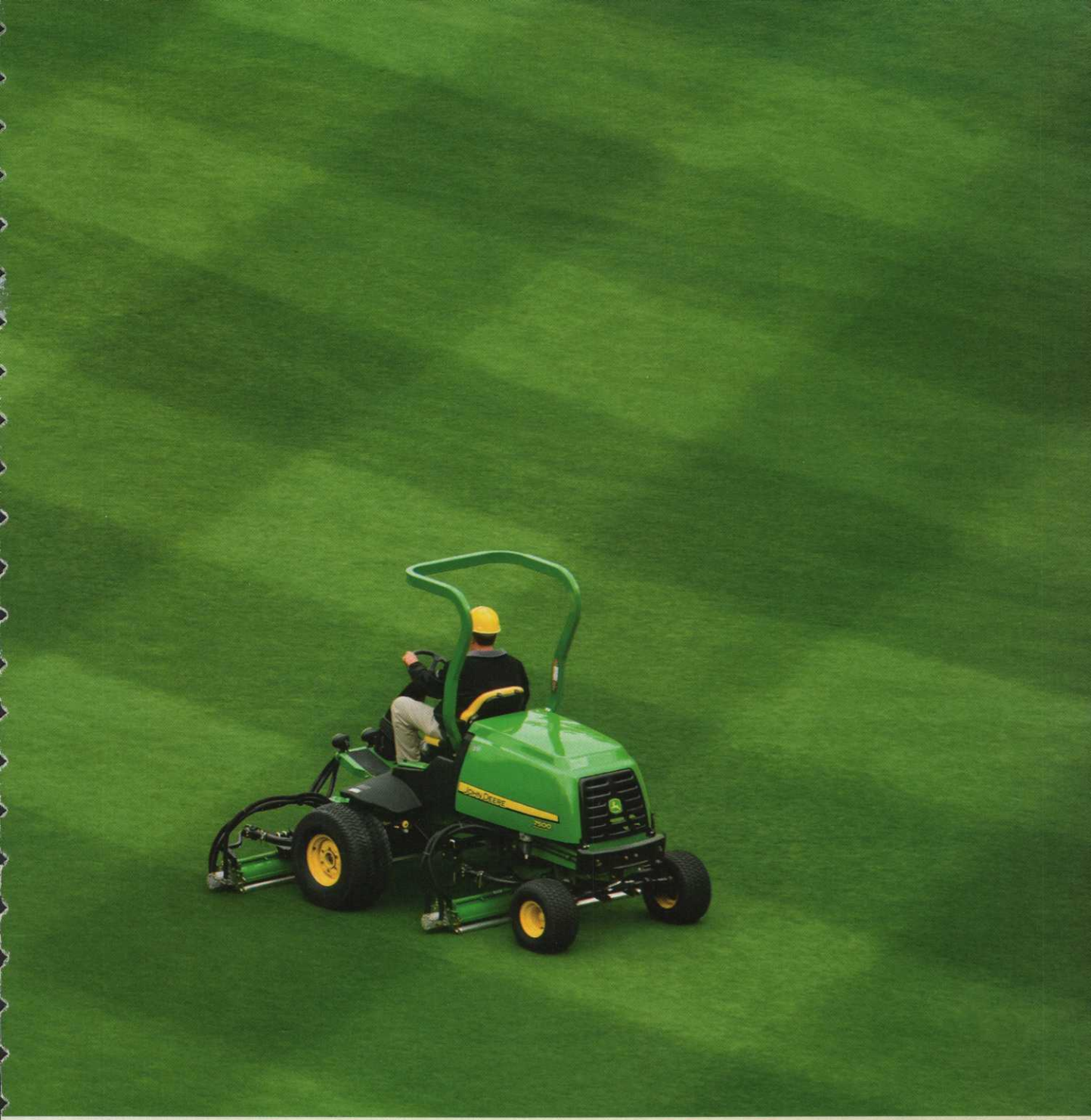

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ber compared to February. This might explain why some "failures" have occurred with certain products as timing may make a difference. For example, since Roundup has very short residual activity, applying it as late in the season as feasible (bermudagrass is still dormant) normally works better than applying it earlier.

The opposite would be true for Princep since it works best on smaller *Poa* plants plus has some soil residual activity.

Overseeded fairways

Much interest has been created on the possibility of using Prograss 1.5EC for postemergence *Poa* control in overseeded ryegrass. The key to success is proper timing.

In the Carolinas, two applications are necessary — the first during the third week in November followed by a sequential application three weeks later. It should not be applied after Jan. 15 as *Poa* control will suffer, and chances of injuring or delaying bermudagrass green-up increases. This is why Prograss should not be used where bermudagrass fails to experience complete dormancy.

Another twist we tried was applying a normal initial pre-emergence herbicide 60 days before overseeding followed by one early December postemergence application of Prograss at 1 pound active ingredient per acre (ai/a). We had excellent *Poa* control through spring of 2006 and good control in 2007.

Finally, bispyribac-sodium (Velocity) allows *Poa* control when treated just prior to seedhead expression. It typically is applied twice, the first in mid to late February followed by a sequential three weeks later. However, temperatures during and immediately following application largely dictate success. Temperatures during the application window should be 70 degrees Fahrenheit daytime and 50 F nighttime (21 degrees Celsius and 10 C, respectively), which is when *Poa* is most actively growing. If applied outside this temperature window, *Poa* is not as actively growing, and the herbicide can dissipate before control occurs.

In 2008, a 17.6 SG formulation of Velocity will be introduced. Rates will range for overseeded fairways from 6 ounces per acre (oz/a) — or 420 grams per hectare (g/ha) — for two applications or 12 oz/acre (840 g/ha) for a single application. Use the higher rate if mature *Poa* is present. Short term (about five days) yellowing to the treated ryegrass may follow application.

Program approach

Since no single product will provide 100 percent control in overseeded fairways containing moderate to heavy *Poa* populations, courses should consider a program approach. The following components of a program approach have provided most consistent *Poa* control in my research. Of course, each step in the program approach adds expense.

1) Apply 0.75 lbs ai/a Barricade 60 days prior to overseeding. By itself, this treatment will provide about 80 percent control.

To boost this percentage, 2) apply either 0.5 oz/a Tranxit 25DG, 0.3 oz/a Monument 75DF, or 9 oz/a Revolver 0.19L prior to overseeding as per their labels. This assumes you are overseeding after Oct. 1, therefore, allowing as much *Poa* as possible to germinate prior to overseeding. Since these are postemergence herbicides, any *Poa* that germinates after application will not be controlled. If overseeding earlier than Oct. 1, Step 2 will have diminishing effects.

3) Apply 1 gallon per acre of Prograss 1.5L in early December to mid-December for early postemergence control. Refer to the previous comments on successful Prograss use.

4) In mid- to late-February, apply Velocity 17.6 SC at 6 to 12 oz/acre (420 to 840 g/ha) when day/night air temperatures are at least 70/50 F, respectively. Repeat in three weeks if using the low rate.

Courses that haven't overseeded in several years might just need Step 1, Step 3, or Step 4. As *Poa* pressure increases, however, more steps are necessary. In heavier *Poa* populations, at a minimum, I would recommend steps 1 and 2. Superintendents should scout their fairways in early December and early February to determine if steps 3 and/or 4 are necessary.

10-Step Plan for Golf Greens

A total management program which favors bentgrass growth over *Poa*, is necessary when battling this weed. Without a totalitarian program against *Poa*, products will be less effective.

1. Fumigate all soil mix before planting or topdressing.
2. Provide good drainage to prevent soil compaction and excessive soil moisture that favor *Poa*.
3. Use certified seed, sprigs or sod free of *Poa* when planting.
4. Obtain and maintain good turf density to reduce *Poa* invasion, including adequate nitrogen.
5. Aerify consistently to relieve soil compaction.
6. Use pre-emergence herbicides in spring and fall.
7. Use PGRs in spring and fall to reduce *Poa* competition and seedhead development.
8. Hand pick or blotter nonselective herbicide (glyphosate, for example) on small *Poa* plants, about 1-inch or 2.5-cm diameter, for example.
9. Plug larger spots with *Poa*-free turf.
10. Provide control in other areas of the golf course to minimize seed transfer to greens by players, water movement, and maintenance equipment.

Bentgrass is sensitive to most postemergence grass herbicides. Additionally, most of these products are ineffective against annual bluegrass. As a result, pre-emergence herbicides are the most common means of controlling this weed on bentgrass golf greens. Erratic control of annual bluegrass, however, has occurred with many pre-emergence herbicides.

The presence of perennial biotypes of the species can contribute to this erratic control. Subsequently, repeat applications over multiple years (minimum of four years) are necessary for significant reduction of the perennial biotypes in bentgrass golf greens. Currently available pre-emergence herbicides labeled for bentgrass golf greens include bensulide (Betasan, Weed Grass Preventer, others) and bensulide plus oxadiazon (Goosegrass/Crabgrass Control).

PGRs

Since annual bluegrass elimination in golf greens is not always achievable with current herbicide technology, suppressing its growth and seedhead production has become a primary goal.

Paclobutrazol (Trimmit) and flurprimidol (Cutless) selectively suppress annual bluegrass in bentgrass golf greens and fairways. Combining these PGRs with other products such as the sterol inhibitor (DMI) fungicides may also help suppress *Poa* in bentgrass. In a typical program, paclobutrazol or flurprimidol is applied to actively growing bentgrass two to three times in fall and two to three times in early spring when the turf is actively growing (50 to 70 degrees F (10 to 21 degrees C). Thirty-day intervals should occur between applications.

DMI fungicides applied two weeks following each PGR treatment increases *Poa* control but also stunts bentgrass growth. Repeating applications during these time periods over several years is necessary to gradually eliminate the perennial biotype. Treatments should not be made during periods of heat, moisture or cold stress to the bentgrass. Treated turf also may appear more "grainy" with a wider leaf texture while treated *Poa* plants often have noticeable discoloration in terms of a lighter-green to yellow color. Other materials (such as mefluidide, maleic hydrazide and ethephon) also are available, but only for higher-mowed turf and/or cause excessive turf damage on closely mowed greens.

The presence of perennial *Poa* biotypes can lead to erratic control and require a program that spans several years.

Acknowledgements:
We conduct numerous Poa research trials yearly. This would be impossible without the cheerful assistance from Clemson University employees, superintendents who allow us to conduct these studies on their courses, and the various companies and their representatives for helping sponsor much of this research. We will have another Poa control mini-field day this spring, so plan on attending and comparing and contrasting your results with others.

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Part 1 of 2

Do Modern Insecticides Defeat IPM Concepts?

The industry must continue to pursue environmentally friendly products for broad-spectrum control

By Rick Brandenburg

In this two-part series, we'll explore the history and development of integrated pest management (IPM) in turfgrass and how it has changed over the past decade. The focus of the article will be on how our newer insecticides have changed so dramatically in recent years and how the manner in which they are used and the timing of application may be perceived as anti-IPM. In addition, the newer products are so much lower in mammalian, bird and fish toxicity and have fewer off-target effects than the products of just a few years ago that IPM may not carry the same sense of urgency that it used to. In some areas, a once-active desire to use biological and natural control has subsided due to the availability of reduced-risk conventional pesticides.

Some of my colleagues and some practitioners may disagree with me. However, as I look around at an increasingly competitive market, higher expectations, continued societal concerns over pesticides, increasing regulations in many areas and newer, less-toxic products, I see a changing perspective on IPM and its implementation.

For many turfgrass managers, controlling insects is not real high on their priority lists. Insects often surprise us, and our ability to manage them quickly and effectively can be difficult. Our thoughts should focus on not only how we can make insect management cost-effective and environmentally friendly, but also how we can make it easier, less time consuming and less of an aggravation for the turfgrass manager who is always multitasking.

In this article, we will look at the definition of IPM and what it means in turfgrass, and some of the challenges we face. In April, we'll take a closer look at efforts to develop new safe products for broad-spectrum control that, in some ways, resemble the products of 20 years ago. Final comments will focus on the need to keep moving ahead with new, more environmentally friendly products that help keep our industry on the right track.

The world around us

IPM is a concept that's been around a long time. When I began my career in the late 1970s, I was involved in the early stages of IPM development and implementation. Much of the driving force associated with IPM development was that in many ways we had become trapped in what was called a "pesticide treadmill." In other words, we were relying more heavily upon the use of synthetic pesticides with no real end in sight. Synthetic pesticides had not been around that long in the late 1960s and early 1970s, and they had proven to be easy, fast and cost-effective for managing pest problems. They increased yields, profits and the acreage that could be grown on farms. Their impact was almost immeasurable.

However, there were more and more concerns surfacing. As early as 1962, Rachel Carson's "Silent Spring" sounded a warning message that these pesticides were having negative impacts in our environment. While one can debate the scientific merit of some of what was written in this book, no one can ignore that it served as a real wake-up call for pesticide use. As researchers studied the interactions of pesticide use and the environment, the disruptive effect

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of pesticide applications on the ecosystem became clearer.

The complex nature of an ecosystem is a challenge to understand. Even a turfgrass setting is very complex. The interactions of organisms and the environment are quite intricate and the balance can be upset easily. One particularly disconcerting discovery in many agricultural systems was that the applications of many pesticides were reducing the populations of beneficial organisms. This often resulted in one of two things happening. First, the pest that was treated would often rebound much faster than its natural enemies and become a problem again in a few weeks. The other situation that was often observed was that other pest problems could be created by eliminating the natural enemies that typically kept them in check once a pesticide was applied. Without going into exhaustive detail, it was these types of scenarios that created the "pesticide treadmill" situation in that each application often seemed to create the need for a second application.

Scientists have spent decades studying various ecosystems from corn fields and orchards to hay fields and even golf courses to understand the complexities associated with each system. This includes the natural enemies that help keep pests in check. Thresholds for treatment were developed that help avoid unnecessary applications, scouting and monitoring techniques that allow us to stay on top of pest problems. Alternative strategies to manage pests were also developed that helped reduce the use of conventional pesticides.

This was the advent of IPM, and it has been implemented in various shapes and forms around the world. One of the challenges in turfgrass is that our threshold are not based upon economics, such as how many bushels of corn will I lose if I do not treat, but rather on aesthetics. This is challenging because beauty is often in the eye of the beholder and there are many standards for turfgrass appearance. This has been problematic as we often tolerate very little damage to turf. We also often had different goals that may include improving turf quality, reducing pesticide use, cutting costs or some combination of these concepts.

Synthetic reliance

We have made considerable progress in the development of alternative strategies for pest control, including cultural practices, endophyte-enhanced turfgrass, biological control, forecasting, monitoring and improved understanding of natural enemies. However, despite all of this, we still rely very heavily upon the use of conventional synthetic insecticides to control our insect pest problems. The effectiveness of these products is so good that, in light of the potential problems that some people believe might occur from pesticide use, we generally accept them as the best way to do business.

For many years we used various scouting and monitoring programs to try and stay one step ahead of pests and apply the insecticides only if we knew a real threat existed for turfgrass damage. This was in keeping with IPM philosophy of using such products in a timely and as needed basis. Many of the older organophosphates gave us a lot of flexibility because they were broad spectrum and killed a lot of different insect pests and could be targeted toward about any stage of the insect. In other words, they were good for just about anything you might be afflicted with and could be used at almost any time. This gave turf managers a lot of flexibility and encouraged us to operate in a reactive, rather than a preventive manner, to solve insect problems.

Many of the older organophosphates offered flexibility, but various human health, regulatory, environmental and business issues began to take their toll in the 1990s.

However, various regulatory, environmental, business and human-health issues began to take their toll on a number of these older products. We saw this change

in availability of older products accelerate following the 1996 signing of the Food Quality Protection Act that looked at all potential exposures to a pesticide group rather than a specific product or use. Since many of the old organophosphates were used so extensively, the potential exposure was quite high. These products began to drop like flies from use in turfgrass. As new products came along, this flexibility to use a single product on almost any insect pest at almost any time seemed to erode.

Two products that drew a lot of attention when they were first introduced about 12 years ago were Merit and Mach2. The guidelines for use of these products for white grub management were to use them in more of a preventive rather than a curative approach. This seemed to be counter to IPM philosophy. In other words we were indicating it was OK to go ahead and put down an insecticide before you even know if you will have a damaging grub population. These products and their recommended use patterns drew a lot of criticism. This was despite the fact that these products were applied at lower use rates as compared to the older chemistries, had lower toxicities to many animals such as fish, birds, people, etc., and actually worked better than most of the older products they replaced.

Over the past 10 years, we've come closer to accepting the use of Merit and Mach2 and are including the newer insecticides Arena, Meridian and Allectus into that same group of products. We realize that with proper scouting, mapping and timely applications, these products can be used in a cost-effective and environmentally friendly manner. While our IPM philosophies often dictate the approach of treating only when an imminent outbreak is about to occur, our ability to do this is often limited. The trade-off is to treat in a more preventive manner, but do it based upon good records of "high risk" areas where grubs consistently occur and use products that have a more favorable environmental profile. That seems to be a good approach. However, we now see competitive marketing encouraging later season use, and turfgrass managers looking to delay the application for these products so they can be used later in the season as more of a curative approach.

Using fertilizers as insecticide carriers changes IPM strategy because we're treating for insects despite their presence.

Another industry trend that challenges our IPM philosophy is the use of fertilizers as insecticide carriers. This approach is one of convenience and cost. It is easy to apply both your fertilizer and insecticide with one application. This is a time and money saving approach. In addition, fertilizers often make very good carriers for insecticides as they release the products very quickly with even a little bit of irrigation or rain. What's the problem with them? Well, the IPM purists will tell us that once we purchase the fertilizer/insecticide combination, we are committed to treating for insects even if they are not really present. Another good point is that the timing makes sense from an agronomic perspective because fertilizer application might not make sense biologically for good timing to control insects. Both of these can certainly be a concern from a cost perspective and product performance. However, for some pests that occur in certain areas on a very consistent basis, the timing for treatment does often coincide with fertilizer use, such as mole cricket or white grub treatments in warm-season turf. In such situations, this can be an excellent option.

Dr. Rick Brandenburg has been conducting research and education programs on insect pest management for more than 25 years. He has taught seminars to golf course superintendents throughout the United States and in more than a dozen foreign countries. He currently serves as co-director of the Center for Turfgrass Environmental Research and Education at North Carolina State University in Raleigh. He can be reached at rick_brandenburg@ncsu.edu.

Bermuda Control Advances

By John Willis and Shawn Askew

Some love it, others hate it. Common bermudagrass is an aggressive warm-season grass that is well-adapted in areas where cool-season turf species are desirable. It spreads and reproduces by seed production, stolons and rhizomes. Once bermudagrass invades cool-season turf, it is persistent and very difficult to control. Bermudagrass negatively impacts aesthetics of a cool-season rough or fairway by disrupting uniformity due to its course texture and its dormant tan to brown color after frosts.

Bermudagrass that infests tall fescue or Kentucky bluegrass usually exists in irregular clumps. If left unchecked long enough, it becomes a solid mat with cool-season remnants and winter annual weeds. Bermudagrass is a desirable turfgrass in the South, but it is a great nuisance to cool-season turfgrass managers. Common bermudagrass is the subject of much frustration for those managing cool-season turfgrasses in the transition zone.

Recommended management

Managing for high quality and competitive cool-season turfgrass year round is the first step toward limiting bermudagrass encroachment. Mowing heights above 3 inches for roughs, controlling brown patch and summer patch diseases, and proper cool-season fertility programs are some cultural practices that can limit bermudagrass invasion. However, the stresses of summer often limit cool-season grasses' competitive ability allowing bermudagrass to out-compete the weakened turf.

Probably the most reliable and consistent way to control common bermudagrass is using sequential applications of glyphosate at 5 pounds of active ingredient per acre (lbs ai/A) leading up to fall renovation and reseeding. This method is obviously very time-consuming and labor-intensive, and leaves the area without turf and unusable until establishment from seed or sod.

Tenacity alone bleaches susceptible plants, turning any young and new growth completely white, while Tenacity plus Turflon does not.

The selective control program that is most commonly recommended uses the combination of fenoxaprop-P (Acclaim, Bayer ES) and triclopyr (Turflon, Dow AgroSciences) or fluazifop (Ornamec, PBI Gordon) and triclopyr sprayed four times at monthly intervals throughout the bermudagrass growing season. Long-term control with this program varies and depends on many factors. Most often, bermudagrass is only suppressed and managers are forced to deal with significant populations the following season.

New chemistry

Several turfgrass researchers have concluded that mesotrione (Tenacity, Syngenta) controls several problem weeds without injuring tall fescue, perennial ryegrass, or Kentucky bluegrass. Mesotrione has pre- and postemergent activity on several annual weeds. Mesotrione will be the first marketed product to selectively control the perennial weeds nimblewill and bentgrass in cool-season turfgrass. In research at Virginia Tech, two to three sequential applications of mesotrione at 4 fluid ounces per acre (fl oz/A) at three-week intervals is best for controlling nimblewill and bentgrass. While the same program injures bermudagrass, it quickly recovers. This activity indicates potential for additive effects when mixed with other chemistry, potentially improving current bermudagrass control programs.

Our results

Our application schemes that avoided summer applications on stressed turf seemed to avoid injury to both Kentucky bluegrass and perennial ryegrass. Perennial ryegrass was more sensitive to mesotrione containing treatments than Kentucky bluegrass. We did note more severe injury during drought conditions. Even though the most severe injury was at levels slightly above 30 percent — the line we draw as "acceptable injury" — the turf was only injured for about one week and completely recovered by three weeks after treatment.

For all herbicide treatments, applying six total applications (three spring and three fall) controlled bermudagrass better than four herbicide treatments (two spring and two fall). Of the three herbicides that we included in combinations, no single product seemed to stand out as the most important to include in the tank mixtures. Of the two-way tank-mixes, fenoxaprop-P plus triclopyr controlled bermudagrass slightly better than mesotrione plus triclopyr, but both treatments

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