Expert Offers Six Keys for Successful Pest Control

By Rick Brandenburg

The effort to develop new pest control strategies for turfgrass never ends. The playing field is always changing as we see new regulations, new turf cultivars, new turf uses, higher expectations and demands, societal concerns over pesticide use and so on.

This ever-changing scene keeps researchers scrambling to develop pest control strategies that are effective, reasonable in cost, reliable, environmentally sound and easy to use.

That is a tall order to fill and requires input from university researchers, industry and turf managers. It also requires a significant level of funding to keep the whole research process rolling in a productive manner.

I believe that the future is good for the continued refinement and improvement of our pest control options so that the demands of turfgrass managers as well as society will be met. In this article, I'd like to discuss where I see the research leading us over the next 10 years and beyond in my particular area of expertise: turfgrass insect pests. I believe there are six areas that will become even more significant in the future and will provide improved approaches to managing these problems.

Forecasting: One of the major factors that render insects such a problem for turfgrass managers is their sporadic nature. Some pest problems, such as certain diseases or weeds, may occur almost every year in certain locations. Insects are often not the No. 1 problem for most turfgrass managers and may occur on a more sporadic basis. Their occurrence may also vary in timing by a few days or even months from one year to the next. Therefore, the main problem with insect control for many turfgrass managers isn't the actual control itself, but rather being able to detect and respond to the problem in a timely manner.

The abundance of environmental monitoring equipment makes keeping track of air and soil temperatures, rainfall, soil moisture, evapotranspiration (ET), and other environmental parameters quite simple, reliable and accurate. Since insects are cold-blooded and much of their development is regulated by temperature, forecasting is possible.

Forecast models have been and continue to be developed for a number of insects pests such as sod webworms, certain white grubs, mole crickets and cutworms. Some are actually in use on a limited basis, and others are still in need of local validation and refinement. Typically, however, factors other than temperature alone affect insect development. Certain aspects of insect biology such as egg-laying may be affected by rainfall, soil moisture and a possible interaction with temperature. This is true for mole crickets, for example, where spring egg-laying (and ultimately egg hatch) can vary by a couple of weeks depending on rainfall even if temperatures are the same.

FIGURE 1

Home page for the Turffiles Web site used for disseminating turfgrass information from the North Carolina State University program.

Our ability to stay on top of insect problems has become even more important since the dramatic changes in insecticide chemistries that have altered the pesticides that superintendents use today. More of our current products are focused on early interception of pest problems. A little later in this article I will discuss biological control. The need to be very timely with product applications is equally true for these control agents.

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What better time to strengthen the turfgrass plant as we move into the late fall and winter months than providing a sound fall fertilization program? The Andersons provides several fall fertilizer options for both cool- and warm-season grasses. For more information, visit our Web site at *www.andersons-golfproducts.com* or call 800-225-2639.

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Information delivery: The ability to forecast insect pests (this is also being done extensively for diseases) leads us naturally to a related area and that is transferring time valuable information to end-users when they really need it.

In today's world of e-mails and Web sites, that's so easy that it requires almost no effort. This technology is of great value to the turfgrass industry, and we probably have just scratched the surface on how to use it to its full effectiveness.

FIGURE 2

Effect of summer sulfur applications to turfgrass on green June beetle grub populations. Three-year average is the number of grubs per square meter.

Treatment	Rate (pounds/1,000 ft^2)	3-yr average
Sulfur	0.5	13.5
Sulfur	1.0	13.6
Untreated	-	24.6

We currently post frequent updates on the turf website at North Carolina State University (*http://www.turffles.ncsu.edu*)(Figure 1). Users can simply check the "Alerts" section each time they log on to determine if there are any warnings for potential or current pest outbreaks. These alerts may be based upon personal observations, reports sent in or weather conditions and forecast programs.

What makes the delivery of these warnings through the Web so valuable is that one can immediately access useful photos, techniques to detect and monitor the pest, as well as control recommendations.

Cultural practices: The use of cultural practices to manage insect pests has been an area that has never received a lot of attention, and perhaps it has been because we've been so focused on the cultural practices that enhance turf quality.

While there is much work to be done in this area, my experience has shown that applications of low rates of sulfur prior to and during the flights of the various white grub beetles dramatically reduce the subsequent level of grubs, for example (Figure 2).

Other studies have shown that properly timing the use of organic fertilizers and adjusting mowing heights can affect grub populations. Additional studies are investigating the role of endophyte-enhanced perennial ryegrass on insect populations. There are many exciting avenues of research under investigation that may allow us to reduce the likelihood of insect pest problems from even developing.

Wetting agents and adjuvants: This is an area that is receiving considerable attention these days for uses that almost exceed our imagination.

I don't know how much these products will influence the ability to use some current insecticides more effectively, but there is a lot of work just getting started to help us better understand how and when to use these products. I encourage you to pay attention to studies where these products are being used head-to-head in sound scientific studies to see if and how they can benefit you.

At this stage in my work with the products, I am noncommittal. I simply don't have enough data to make a strong case one way or the other, but there are a lot of testimonials that can be considered.

Biological control: This is an area that has always created a lot of excitement, but often seems to let many people down in its implementation. It seems that products and programs have come and gone through the years with little consistent progress. Many people look back on the old milky spore products for Japanese beetle grubs that have been around for decades as the one and only success story in biological control of insects in turfgrass.

There have been and continue to be different products on the market today that include entomogenous nematodes, fungi, bacteria and viruses.

There have been a number of products that have appeared on the market through the years that seem to simply disappear as quickly as they showed up. This may have been appropriate for some products.

One thing we know for sure is that many of the biological products cannot simply be sprayed and forgotten as we often do with conventional pesticides. In fact, it's perhaps unfair to even compare them side-by-side. They are two different beasts

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when it comes to insect control, and they provide different advantages and disadvantages.

Most biological control products (but not all) are going to require application to a specific insect life stage, maintenance of a certain environmental condition for a few days after application (i.e. frequent light irrigations), a little more patience in the time to control the pest and a little extra effort in the application.

Recent studies, including the research we have underway at North Carolina State University, (see the collaborative article by Sarah Thompson and myself on page 55) have helped us understand some of the problems associated with biological control.

Insects have some remarkable qualities that help them avoid the detrimental affects of exposure to these control agents. We will ultimately be able to use these control strategies more effectively as we understand more about these interactions with the pest and the biological control organism.

Resistant turf types: Several programs around the country have focused on the development of turfgrass cultivars that are resistant to certain pests, including insects. These include armyworms, chinch bugs, and mole crickets. In some cases, it has been through the use of endophyte-enhanced turfgrasses that toxins are provided to protect the plant primarily from surface feeding pests. In other cases, a level of protection is also provided against soil pests. This has been used in areas that grow cool-season turfgrass and is not available in warm-season turf types.

Other programs have sought to develop varieties that are either more tolerant to insect feeding, less preferred by the insects or offer some protection through a toxin or physical barrier. Check with local experts on what is available and adapted to your area.

Conclusions

When you consider the dramatic change in regulations and public perceptions that have occurred in the turfgrass industry the past few years, it's obvious that the rules for controlling turf pests have changed considerably — and they're not going back to where they were before.

One look at the changing situation in Canada with local legislation reducing or eliminating the option of using conventional pesticides on turfgrass for cosmetic purposes tells us that pest management in turf will be an ever-evolving process.

As pest control options change, it becomes increasingly important that superintendents' knowledge of pests (weeds, insects, diseases, nematodes) is up to date. Understanding pest biology and ecology has never been more important. As our control approaches get more sophisticated, our knowledge of the pests we battle must keep pace.

Increasing your knowledge base about pests will never work against you. It can only help. It's sort of like what we tell our kids when they ask why they have to take certain classes that they see no use for in the future. We tell them, "Trust me, you'll be glad you took it. You'll need it someday."

The same is true for gaining a good understanding about all the pests you battle.

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