TURFGRASS TRENDS

WHITE GRUB CONTROL

White Grubs Still Pose Challenge to Turfgrass Research

By Rick Brandenburg

White grubs have been one of the key insect pests of turfgrass throughout the world and in particular in the United States. Very few locations that can grow quality turf are immune to potential damage from the larvae of a number of beetles. The feeding of the grubs damages turfgrass by destroying the integrity of the root system, loosening the soil and often attracting various predators that destroy the turf to gain access to the grubs as food.

There is a wide range of grub species in the country ranging from the Japanese beetle grub to grubs of the Oriental beetle, green June beetle, European chafer and various masked chafers to name a few. Life cycles vary as do the preferred sites of infestation. Despite the variations and differences, there is one consistent theme: White grubs are as much, if not more, of a problem today, than at any time in the past.

Even with new materials, it is important to develop better understanding of factors that influence white grub infestations and management.

Maybe it is our increased expectations and desire for the perfect golf course or sports field that make it appear to us that grubs are now more serious than in the past. It is possible our increased use of irrigation and other cultural practices have made turfgrass in many areas more susceptible or a better host. Maybe it is simply that the white grubs are taking advantage of what we are offering — better food and a more suitable environment.

Whatever the reason and whether it is real or perceived, if we add up all the insect concerns across the country, I think we'd find grubs would rank as No. 1. Fire ants, mole crickets and other pests may certainly be more of a problem in selected locations, but overall grubs stay at the top. Grubs remain a serious problem primarily because they are a soil insect that lives underground. This creates problems for early detection and getting the insecticide in contact with the white grub.

Modern insecticides such as Mach 2 (halofenozide), Merit (imidacloprid) and Arena (clothianidin) work most effectively when applied in a more preventive manner rather than as a rescue to clean up an existing problem. This requires a thorough knowledge of pest history of infestations and the life cycle of the insect. While this was initially a big shift in thinking for most turfgrass managers, we have become fairly proficient in our wise and cost-effective use of these materials.

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FIGURE 1

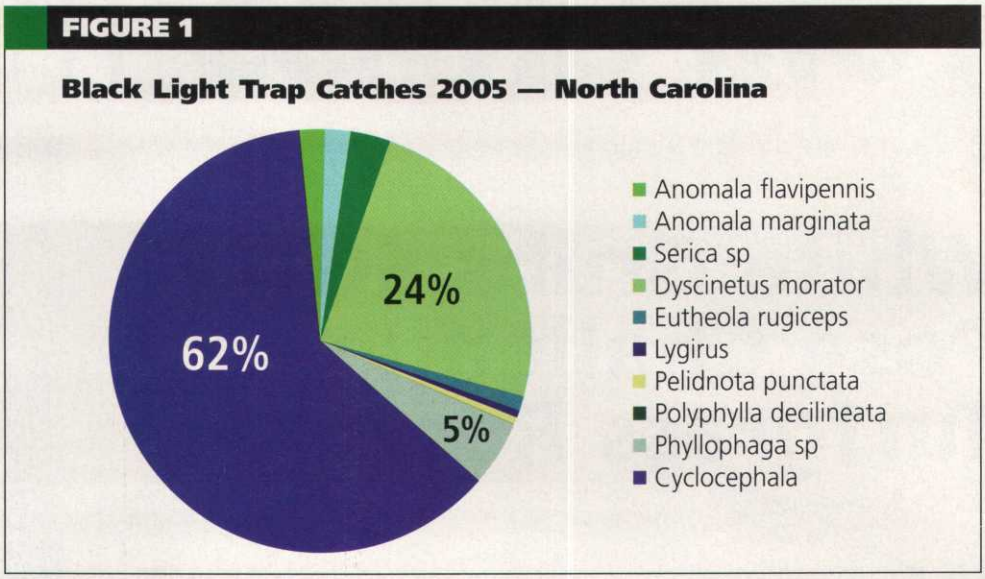

Figure 1. Distribution of species of white grub adults captured in light traps across North Carolina, 2005.

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Even with new, more environmentally sound materials available, it is important that we develop a better understanding of white grub biology and the factors that influence white grub infestations and management. Perhaps that should be restated to say that now with the new insecticides, it is more important than ever to develop the best possible understanding of pest biology. While scientists have been studying white grubs for a long time, there is still a lot to learn.

Add to this the fact that our turfgrass systems have also evolved over the last 25 years and it leaves us with much still to learn about white grub biology and ecology. Some areas, such as the southern United States, lag behind in our data base for understanding white grubs. The rapid population increase in the South over the past 25 years has resulted in a lot more turfgrass and new problems showing up throughout this region.

Unfortunately, we don't have a lot of history of research in some areas and we can't always extrapolate information from other areas. As a result, there's a lot of research taking place in many locations focusing on white grub ecology and management.

In North Carolina, we have experienced an increase in white grub problems in turf on both warm- and cool-season turfgrasses. There are problems with southern masked chafers, northern masked chafers, Oriental beetles, green June beetles, Japanese beetles and others depending upon the location and type of turfgrass. The severity of the problems, the cost of control, and the need for effective control has prompted renewed research to gain better insight into white grub biology in the Southeast. It is hoped that this research in conjunction with other studies, such as those by Dr. Eileen Buss at the University of Florida, will paint a clear picture of white grub problems in the Southeast and add to our understanding of these pests on a national basis.

Initial research in North Carolina has begun with the basics. We are determining the full complement of species of grubs present through a network of light traps and pheromone traps. This allows us to not only determine the species and the timing of their flights (and an indication of egg laying and hatch), but also the distribution of each species.

While we have seen a few species show up in certain areas that we did not necessarily expect, the majority of the species found were the masked chafers and Japanese beetles with a few Oriental beetles in the western areas of the state. The light traps (not used to capture Japanese beetles) determined that masked chafers (Cyclocephala sp.) were far and away the most

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FIGURE 2

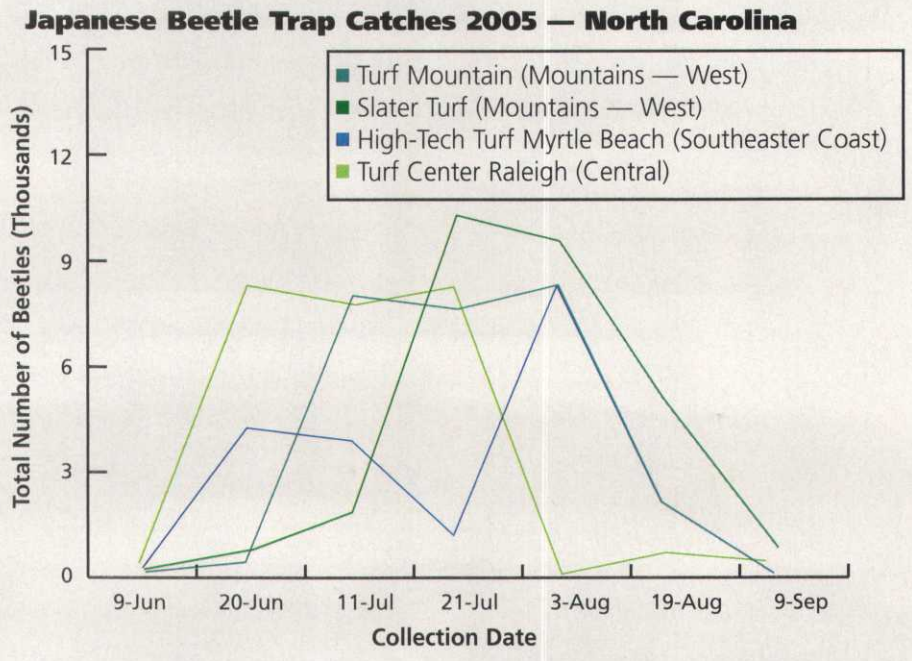

Figure 2. Timing of Japanese beetle trap captures for locations in North Carolina and South Carolina in 2005.

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abundant species (Figure 1). What has been surprising has been the timing of flights in different areas of the state. We operate under the assumptions that since insects are cold-blooded that activity will begin in warmer areas at an earlier calendar date than in cooler areas. However, light trap catches from 2005 demonstrate that the reliability of this assumption is suspect.

Data from a southern coastal area near Myrtle Beach show beetle flights occurring at the same time as in a much cooler area in the foothills of western North Carolina (Figure 2). We know that rainfall, or the lack of it, can delay the emergence and flights of the beetles. However, soil moisture and rainfall were not limiting factors in the Myrtle Beach area. While somewhat surprising, it confirms the message that we so often preach about monitoring your pests and not taking any pest management steps based solely upon the calendar date.

An equally interesting situation occurs in the Phoenix/Scottsdale area of Arizona. Recent grub problems in turfgrass, especially on golf courses, have been exacerbated by the presence of javelinas coming in out of the desert to feed on the grubs and destroy turfgrass in the process. In the past three years, Dr. Kai Umeda, turfgrass specialist at the University of Arizona, has initiated a program to monitor beetle flights with light traps since turfgrass managers were reporting poor control from insecticide applications. The resulting data show a wide range of beetle flights throughout the valley area.

Not only is the climate in different areas playing a major role, but different species are present that influence the timing of beetle flights and egg laying (Figure 3).

Without this information, grub control was challenging and frustrating. With this newly acquired data, grub control is now a practical and cost-effective venture.

There are many factors that influence white grub populations and unfortunately we don't understand them all. Why are white grubs more of a problem? I certainly believe that more irrigated turf is a contributing factor simply because the eggs and small grubs need fairly good soil moisture to survive. If left up to nature there would be many years when

FIGURE 3

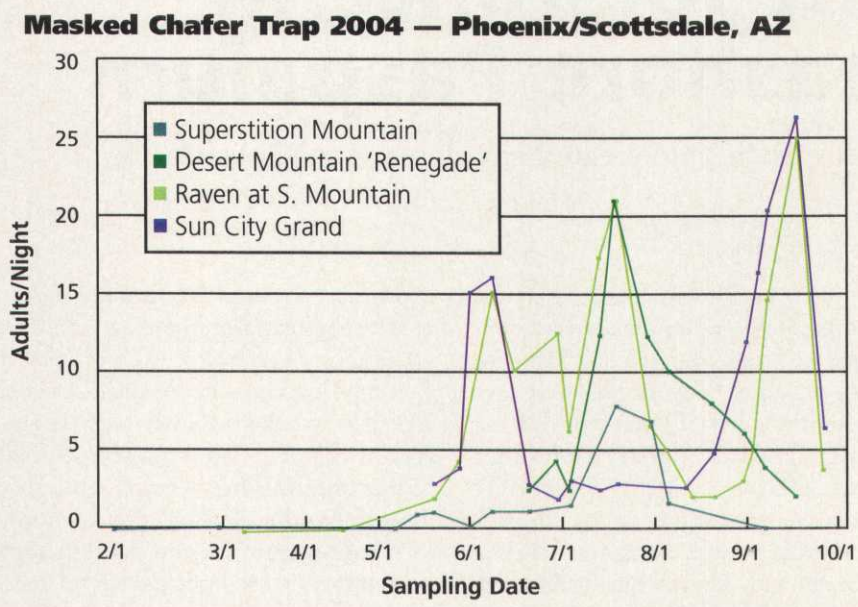

Figure 3. Timing of white grub adults light trap catches in the Phoenix/Scottsdale area illustrate a wide range of peak flights for different locations. (Data courtesy of K. Umeda and G. Towers, University of Arizona)

the survivability of the grubs would be fairly low during dry periods.

However, a new component has been added to the concept of irrigation and that is the use of effluent water. This is becoming an increasingly common trend and we do not fully understand all of the implications of using effluent water. There is an improved data base on effluent water from an agronomic perspective, but how does it influence pest problems and even various pesticides? We aren't sure.

My observations are that white grubs are more common in areas that are using effluent water. I don't have a survey to fully document this nor am I saying that if you use effluent water you will suffer from a serious grub problem. Rather, I do believe the two seem to go together. We are conducting field and greenhouse trials to document this phenomenon and determine why. We know that many beetles do prefer areas with more organic matter and maybe they are selectively going after specific areas that are made more attractive by effluent water. We do know that with the use of low rates of sulfur, for example, we can reduce the incidence of green June beetle grubs by 50 percent.

Green June beetles are one of the most common grubs we find in areas with elevated levels of organic matter. So developing a better understanding of the cues that beetles pick up on to determine in which turf areas they will lay their eggs could be an important step toward developing the means to reduce their abundance.

Research to develop a better understanding of white grub biology is under way in many locations. Despite past research efforts that have been of significant benefit in developing our management programs, there is still room for more information in a lot of geographic locations. Making sure turfgrass managers are working with information that applies to their part of the world is critical if you want to be cost effective. There are several new white grubs products we will see starting as early as this fall. They have been very effective in trials across the country. The effectiveness of new products will not, however, make it possible to ignore white grub biology when making an application.

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