Identifying and Managing White Grubs in Turf

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White grubs are the larval stage of several scarab beetle species that feed on grass roots causing wide variation in damage. Last fall, we saw an abundance of white grub damage around Vermont, so it is likely, that we will see more damage this spring and summer. However, grub damage can vary significantly from year to year and we know that turf that receives adequate water and has a healthy root system can tolerate high numbers of grubs without showing signs of damage. Research in upstate New York has shown that insecticide treatments are only needed about twenty percent of the time on both home lawns and golf course fairways; therefore, the consistent use of a season long preventative insecticide is unnecessary in a majority of cases.

Grub Identification

It is important to be able to identify which species is causing a problem since control methods may only be affective for certain species. Last year, I met a homeowner in Burlington who had been trying for a few years to control his grub problem with milky spore disease. In spite of the fact that this biological control has not been shown to be very affective due to our cold soils in Vermont, it certainly will not work if the grub is not Japanese beetle (commercial products of milky spore are specific to Japanese beetle). As it turned out, the major grub species that this homeowner had was Oriental beetle which is not controlled by commercial milky spore.

In the Northeast, we have at least eight different species of insects classified as white grubs. Four species are native (black turfgrass ataenius, green June beetle, May or June beetles, northern masked chafer) and four are exotic or introduced (Asiatic garden beetle, European chafer, Japanese beetle, Oriental beetle).

A good time to identify grubs is in May or June when most grub species are in the 3rd instar and large enough to ID with a good hand lens or a 10 x magnifying glass. Late August and September are also good times to look. You can usually ID grubs by observing their raster patterns. A couple factsheets that help in identifying grubs can be found on the web at: ohioline.osu.edu/hyg-fact/2000/2510.html and www.umassturf.org/publications/fact_sheets/insects/white_grub_ID.pdf. You can also collect grubs and send them to the UVM Diagnostic Lab for Identification. If you place the grubs in moist soil in a plastic bag with pin holes, they will keep for a while. Download the Plant Diagnostic Clinic Specimen Form (http://pss.uvm.edu/pd/pdc/), complete it as much as possible and mail it in with the grub sample.

Cultural Practices for Managing Grubs

Grub management should include cultural practices but can also include biological and chemical control strategies. Unfortunately, there are no known turfgrass species or cultivars resistant to white grubs; however, the spreading growth habit of Kentucky bluegrass and creeping bentgrass can be beneficial for filling in thin spots caused by grub damage. Although not resistant per se, drought tolerant grasses such as fine fescues and endophyte-enhanced tall fescue and perennial ryegrass may recover more quickly from grub damage. Good cultural practices such as adequate irrigation and fertilization can also help offset grub damage. Actively growing turf with healthy roots have been shown to tolerate populations up to 50% higher than recommended thresholds without showing damage. Fall fertilization can help with recovery of grub damage; however, high nitrogen applications in the spring will usually encourage shoot growth at the expense of root development which can make the turf more susceptible to spring and summer grub damage.

Chemical Control

For chemical control, there are two basic approaches for managing grubs: 1) a preventative application of a slow-acting and long lasting insecticide such as chlorantraniliprole or imidacloprid applied in the summer to prevent subsequent infestations, or 2) a reactive or curative application in autumn based on the actual presence of grubs at a action threshold population using fast acting chemicals such as trichlorfon.

With the preventative method, applications are made too early to utilize scouting information. Although these insecticides have a low mammalian toxicity and are applied at a low rate, they do have a longer window of exposure which can negatively impact natural predators and other non-target fauna. Therefore, this approach should only be warranted in areas that consistently have damaging grub populations or in high risk situations with high value turf. With the second approach, scouting can be used to assess threshold populations and spot treatments can be applied just on affected areas. Unfortunately, the insecticides for this approach are relatively high in mammalian toxicity and are applied at a high rate of active ingredient; therefore, caution and appropriate applications are even more critical.

Spring treatments are not recommended. Usually, the grubs are large enough to be tolerant of insecticides. Also, the grass is usually growing at a fast enough rate to compensate for grub damage. According to Cornell's IPM recommendations, regardless of insecticidal approach, best IPM should have attributes that include reliability, reduced-risk, late-season efficacy, narrow spectrum of activity, fast-action and low cost.

Biological Control of Grubs

There are at least three biological control agents commercially available for white grubs in turf: entomopathogenic nematodes, entomopathogenic fungi, and the milky spore disease bacteria. Although affective in laboratory studies, these alternatives have relatively poor or inconsistent results in the field. Some of the reasons may include unsuitable environmental conditions such as cold or droughty soils, insufficient water at time of application, improper storage and handling

of the organisms and incorrect species (particularly a problem with the nematodes). However, there may be situations where a turf manager wants to try a biological due to insecticide restrictions. When purchasing these products it is important to be assured that they were handled in an appropriate manner to assure viability of the organisms and that you carefully follow all the directions during and after application.

The above approaches to biological control are classified as unindative since you are directly applying organisms to the host pest. A more "classical" method of biological control is the general release of predators that have a narrow host range for that particular pest. In the early 1930's, USDA entomologists imported a predatory wasp, *Tiphia vernalis* Rohwer (Hymenoptera Tiphiidae), from Korea for the biological control of the Japanese beetle. Numerous releases were made throughout the Northeast. Recent work at the University of Connecticut has focused on this insect and its ability to parasitize Japanese and Oriental beetle grubs. One area of their research is to find ways to conserve this predator wasp in the landscape in order to enhance their survival, spread and efficiency in attaching grubs. One interesting approach is to plant peonies which apparently are excellent nectar sources for the wasp. A study in Kentucky had shown that peonies increased wasp populations and parasitism of Japanese. So, researchers in Connecticut are evaluating different peony varieties to test their efficacy in wasp population improvement.

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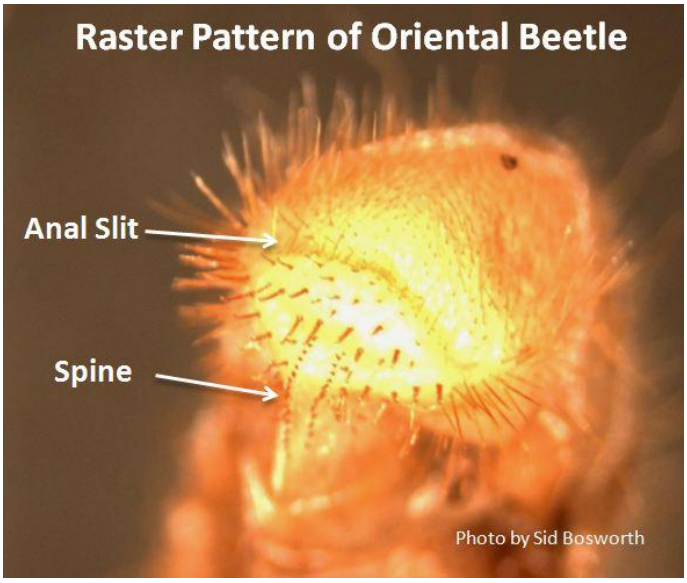
Oriental Beetle Grubs in Vermont

Sid Bosworth and Taylor LaFleur[1]

There was a fair amount of grub damage to turf in the Chittenden County area this past August and September. One particular grub we found that, according to state entomologist Jon Turmel, had not be detected in Vermont before, was the oriental beetle (*Exomala orientalis*). In five sites evaluated in September, the majority of the grubs were Oriental and a few were Asiatic garden beetle grubs. We did not find any Japanese beetles at those particular sites even though it commonly shows up in Vermont.

Like the Japanese beetle, this grub has one life cycle per year and feeds on grass roots. It emerges from the soil as an adult in mid-summer and begins laying eggs in late July/early August. The young grubs will feed on roots until mid-autumn, over winter usually in the larval stage, and resume feeding on roots in the spring until they pupate. Although the adult oriental beetle will feed on roses, phlox and petunias, their damage is not nearly as extensive as the Japanese beetle adults. Also, the adults tend to feed at night and may not be observed as readily since their coloration (light brown to black often with darker mottling on the wings) is not as noticeable as the Japanese beetle. It is the grubs that cause the most damage, and not only to turfgrass but also to many perennial plants, nursery stock and potted plants. Symptoms of turf damaged by oriental beetle grubs are similar to other grubs. They are very effective at severing the roots, so leaf blades pull up easily from damaged tillers. Secondary damage is often caused by skunks and birds digging up to turf to get to the grubs.

Identification of Grubs – Since we have about four or five species of grubs in Vermont, it is important to be able to identify them in order to better manage them. The best way to ID them is to gently roll the grub out and look on the underside of the posterior segment with a 10X or greater magnifying glass. For the oriental beetle, there are distinct raster patterns different than the other white grubs. One is the broad transverse anal slit across the end of the posterior segment in combination with the parallel line of spines running up the segment perpendicular to the anal slit. Japanese beetle has a similar anal slit shape but its spines for a V shape.



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